Bachelor of Engineering (Honours) in Electrical Engineering

Full-time / Sandwich
Programme Code : 41070
2012/2013
DEFINITIVE PROGRAMME DOCUMENT
Bachelor of Engineering (Honours) in Electrical Engineering 2012/13

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<td>6.15</td>
<td>Compulsory Graduation</td>
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</table>

Appendix I  Subject Description Forms

Appendix II  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 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 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)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td>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 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>
<td></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 II.

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 MathematicsAMA106 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 3.2.1.

<table>
<thead>
<tr>
<th>Programme Objectives</th>
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<td>A1</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
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<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td></td>
<td>✓</td>
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</tr>
<tr>
<td>A6</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B1</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</table>

Table 3.2.1 Mapping between Programme Objectives and Programme Outcomes

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

Relationship between Institutional Learning Outcomes and Intended Learning Outcomes (ILO) of the programme is shown in Table 3.2.2

<table>
<thead>
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<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>✓</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>A6</td>
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<td>✓</td>
<td></td>
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</tr>
<tr>
<td>B3</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2.2 Relationship between Institutional Learning Outcomes and Intended Learning Outcomes (ILO) of the programme
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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Dept.</th>
<th>Contact Hours</th>
<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA201</td>
<td>Mathematics I</td>
<td>AMA</td>
<td>42</td>
<td>3</td>
<td>0.2</td>
<td>40% 60%</td>
</tr>
<tr>
<td>AMA202</td>
<td>Mathematics II</td>
<td>AMA</td>
<td>42</td>
<td>3</td>
<td>0.2</td>
<td>40% 60%</td>
</tr>
<tr>
<td>EE2011</td>
<td>Applied Electromagnetics</td>
<td>EE</td>
<td>36</td>
<td>12</td>
<td>3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>ENG224</td>
<td>Information Technology</td>
<td>ENG</td>
<td>37</td>
<td>17</td>
<td>3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>ENG232</td>
<td>Engineering Science</td>
<td>ENG</td>
<td>54</td>
<td>4</td>
<td>3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>ENG236</td>
<td>Computer Programming</td>
<td>ENG</td>
<td>53</td>
<td>-</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>ENG237</td>
<td>Basic Electricity and Electronics I</td>
<td>ENG</td>
<td>51</td>
<td>9</td>
<td>3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>ENG238</td>
<td>Basic Electricity and Electronics II</td>
<td>ENG</td>
<td>55</td>
<td>11</td>
<td>3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>MM2021</td>
<td>Management &amp; Organisation</td>
<td>MM</td>
<td>42</td>
<td>-</td>
<td>3</td>
<td>50% 50%</td>
</tr>
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**Def Subjects**

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### Curriculum

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<td>36 12</td>
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<td>60%</td>
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<tr>
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<td>Electromechanical Energy Conversion</td>
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<td>36 12</td>
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<td>EE3031</td>
<td>Power Electronics and Drives</td>
<td>EE</td>
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<td>Power Transmission and Distribution</td>
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<tr>
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<td>Telecommunication Fundamentals</td>
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#### Def Subjects

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<td>Lab</td>
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<td>EE3502</td>
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<td>Industry</td>
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<td>Training credits</td>
<td>100% assessed on Pass/Fail basis</td>
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Note: The Department reserves the right of NOT offering all electives in each year.

Table 4.1.2

### Notes

- The Department reserves the right of NOT offering all electives in each year.
### THE HONG KONG POLYTECHNIC UNIVERSITY

#### BEng (Hons) in Electrical Engineering

### Levels 4 and 5

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### 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.

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</tr>
<tr>
<td>ENG232</td>
<td>Engineering Science</td>
</tr>
<tr>
<td>ENG236</td>
<td>Computer Programming (2 credits in semester 1)</td>
</tr>
<tr>
<td>ENG237</td>
<td>Basic Electricity and Electronics I</td>
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**Semester One**

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<th>AMA202</th>
<th>Mathematics II</th>
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<td>CBS2080</td>
<td>Fundamentals of Chinese Communication</td>
</tr>
<tr>
<td>ELC2502</td>
<td>University English II (2 credits)</td>
</tr>
<tr>
<td>EE3061</td>
<td>Analysis Methods for Engineers</td>
</tr>
<tr>
<td>ENG236</td>
<td>Computer Programming (1 credit in semester 2)</td>
</tr>
<tr>
<td>ENG238</td>
<td>Basic Electricity and Electronics II</td>
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<td>GEC2801 or equivalent</td>
<td>China Studies (2 credits)</td>
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<tr>
<td>MM2021</td>
<td>Management &amp; Organisation</td>
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</table>

**Semester Two**

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<th>Engineering Communication and Fundamentals (120 hours throughout the year)</th>
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<tbody>
<tr>
<td>IC2112</td>
<td>IC Training I (EE) (120 hours in summer)</td>
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**Table 4.2.1**

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.

<table>
<thead>
<tr>
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<tr>
<td>EE2011</td>
<td>Applied Electromagnetics</td>
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<tr>
<td>EE3011</td>
<td>Analogue and Digital Circuits</td>
</tr>
<tr>
<td>EE3041</td>
<td>Power Transmission and Distribution</td>
</tr>
<tr>
<td>EE3131</td>
<td>Telecommunication Fundamentals</td>
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<tr>
<td>AF2108</td>
<td>Financial Accounting</td>
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<td>GEC2XXX</td>
<td>Broadening General Education Subject (2 credits)</td>
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**Semester One**

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<td>EE3021</td>
<td>Electromechanical Energy Conversion</td>
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<td>EE3121</td>
<td>Computer System Principles</td>
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<tr>
<td>EE3031</td>
<td>Power Electronics and Drives</td>
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<tr>
<td>EE3111</td>
<td>Project Methodologies (2 credits)</td>
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<td>EE321</td>
<td>Electrical Services in Buildings</td>
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<td>Economics for Engineers</td>
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**Semester Two**

| EE3502 | Summer Practical Training (6 weeks in summer) (3 training credits) |

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

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<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>
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</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 102 academic credits to qualify for graduation.

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<td>Power Systems</td>
</tr>
<tr>
<td>EE4041</td>
<td>Engineering Project Management</td>
</tr>
<tr>
<td>EE4121</td>
<td>Individual Project (This is continued in semester 2. Total 9 credits for semesters 1 &amp; 2)</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>
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<td>Individual Project (This is a continuation from Semester 1. This subject is of 9 credits for both semesters 1 &amp; 2)</td>
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<td>ENG307</td>
<td>Society and the Engineer</td>
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</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.

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<tr>
<td>EE527</td>
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</tbody>
</table>

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.

Subject Level

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

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

Language of assessment

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

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

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

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

6.7 Assessment Methods

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

Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous Assessment assignments which involve group work 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, and this can result in different grades being awarded to students in the same group.

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

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

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

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

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 semester, the status of ‘academic probation’ will be lifted. The status of ‘academic probation’ will be reflected in the examination result notification but not in the transcript of studies.

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

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

A student may be de-registered from the programme enrolled before the time frame specified in categories (a) or (b) above if his/her academic performance is poor to the extent that the Board of Examiners considers that there is not much of a chance for him/her to attain a GPA of 2.0 or above at the end of the programme 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 overall 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 Grading and GPA’s

Grading
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</td>
<td>The student’s work is exceptionally outstanding. It exceeds the intended subject learning outcomes in all regards.</td>
</tr>
<tr>
<td></td>
<td>Outstanding</td>
<td></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.

<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.
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 point obtained in the final attempt will be included in the GPA calculation.

**Different types of GPA’s:**

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

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

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

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

(e) For students taking the Major/Minor study route, a separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for Board of Examiners to moderate the award classification for the Major, as explained further in Appendix II.
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) A pass in Foundation Mathematics (AMA106)*.

* It is only applicable to admittees who do not have a ‘pass’ in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who pass the MBT are exempted from this graduation requirement and they follow the normal study pattern. Those who fail or do not attend the MBT are required to take a non-credit bearing subject AMA106 ‘Foundation Mathematics’, which is a pre-requisite for AMA201. A pass in AMA106 ‘Foundation Mathematics’ is thus a graduation requirement for such students.
6.12 Classification of Awards

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 6.12 Degree Classification Guidelines

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

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

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

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

6.14 Aegrotat Award

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

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

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

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

6.15 Compulsory Graduation

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

Subject Description Forms
### Content

**Subjects**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF2108</td>
<td>Financial Accounting</td>
<td>AI</td>
</tr>
<tr>
<td>AF3901</td>
<td>Economics for Engineers</td>
<td>AI</td>
</tr>
<tr>
<td>AF5107</td>
<td>Accounting for Engineers</td>
<td>AI</td>
</tr>
<tr>
<td>AMA201</td>
<td>Mathematics I</td>
<td>AI</td>
</tr>
<tr>
<td>AMA202</td>
<td>Mathematics II</td>
<td>AI</td>
</tr>
<tr>
<td>BSE463</td>
<td>Design of Mechanical Systems in Buildings</td>
<td>AI</td>
</tr>
<tr>
<td>CBS2080</td>
<td>Fundamentals of Chinese Communication</td>
<td>AI</td>
</tr>
<tr>
<td>CSE508</td>
<td>Environmental Impact Assessment</td>
<td>AI</td>
</tr>
<tr>
<td>CSE516</td>
<td>Urban Transport Planning – Theory and Practice</td>
<td>AI</td>
</tr>
<tr>
<td>EE2011</td>
<td>Applied Electromagnetics</td>
<td>AI</td>
</tr>
<tr>
<td>EE3011</td>
<td>Analogue and Digital Circuits</td>
<td>AI</td>
</tr>
<tr>
<td>EE3021</td>
<td>Electromechanical Energy Conversion</td>
<td>AI</td>
</tr>
<tr>
<td>EE3031</td>
<td>Power Electronics and Drives</td>
<td>AI</td>
</tr>
<tr>
<td>EE3041</td>
<td>Power Transmission and Distribution</td>
<td>AI</td>
</tr>
<tr>
<td>EE3051</td>
<td>Systems and Control</td>
<td>AI</td>
</tr>
<tr>
<td>EE3061</td>
<td>Analysis Methods for Engineers</td>
<td>AI</td>
</tr>
<tr>
<td>EE3111</td>
<td>Project Methodologies</td>
<td>AI</td>
</tr>
<tr>
<td>EE3121</td>
<td>Computer System Principles</td>
<td>AI</td>
</tr>
<tr>
<td>EE3131</td>
<td>Telecommunication Fundamentals</td>
<td>AI</td>
</tr>
<tr>
<td>EE321</td>
<td>Electrical Services in Buildings</td>
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<tr>
<td>EE3502</td>
<td>Summer Practical Training</td>
<td>AI</td>
</tr>
<tr>
<td>EE4011</td>
<td>Digital Control and Signal Processing</td>
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</tr>
<tr>
<td>EE4021</td>
<td>Electrical Machines</td>
<td>AI</td>
</tr>
<tr>
<td>EE4031</td>
<td>Power Systems</td>
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<td>EE4041</td>
<td>Engineering Project Management</td>
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<tr>
<td>EE4121</td>
<td>Individual Project</td>
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<td>EE4211</td>
<td>Advanced Power Electronics</td>
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<tr>
<td>EE4221</td>
<td>Applied Digital Control</td>
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</tr>
<tr>
<td>EE4251</td>
<td>Electric Traction and Drives</td>
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</tr>
<tr>
<td>EE4261</td>
<td>Fibre Optics</td>
<td>AI</td>
</tr>
<tr>
<td>EE4281</td>
<td>Industrial Computer Applications</td>
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</tr>
<tr>
<td>EE4291</td>
<td>Intelligent Buildings</td>
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<tr>
<td>EE4301</td>
<td>Power System Protection</td>
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<td>EE4341</td>
<td>Intelligent Systems Applications in Electrical Engineering</td>
<td>AI</td>
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<tr>
<td>EE501</td>
<td>Alternative Energy Technologies</td>
<td>AI</td>
</tr>
<tr>
<td>EE502</td>
<td>Modern Protection Methods</td>
<td>AI</td>
</tr>
<tr>
<td>EE505</td>
<td>Power System Control &amp; Operation</td>
<td>AI</td>
</tr>
<tr>
<td>EE509</td>
<td>High Voltage Engineering</td>
<td>AI</td>
</tr>
<tr>
<td>EE510</td>
<td>Electrical Traction Engineering</td>
<td>AI</td>
</tr>
<tr>
<td>EE512</td>
<td>Electric Vehicles</td>
<td>AI</td>
</tr>
<tr>
<td>EE514</td>
<td>Real Time Computing</td>
<td>AI</td>
</tr>
<tr>
<td>EE517</td>
<td>Fibre Optic Components</td>
<td>AI</td>
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<tr>
<td>EE520</td>
<td>Intelligent Motion Systems</td>
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</tr>
<tr>
<td>EE521</td>
<td>Industrial Power Electronics</td>
<td>AI</td>
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<tr>
<td>EE522</td>
<td>Optical Fibre Systems</td>
<td>AI</td>
</tr>
<tr>
<td>EE524</td>
<td>Open Electricity Market Operation</td>
<td>AI</td>
</tr>
<tr>
<td>EE525</td>
<td>Energy Policy and Restructuring of Electricity Supply Industry</td>
<td>AI</td>
</tr>
<tr>
<td>EE526</td>
<td>Power System Analysis and Dynamics</td>
<td>AI</td>
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<tr>
<td>EE527</td>
<td>Auto-tuning for Industrial Processes</td>
<td>AI</td>
</tr>
<tr>
<td>EE528</td>
<td>System Modelling and Optimal Control</td>
<td>AI</td>
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<tr>
<td>EE529</td>
<td>Power Electronics for Utility Applications</td>
<td>AI</td>
</tr>
<tr>
<td>EE530</td>
<td>Electrical Energy-saving Systems</td>
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</tr>
<tr>
<td>ELC2501</td>
<td>University English I</td>
<td>AI</td>
</tr>
<tr>
<td>ELC2502</td>
<td>University English II</td>
<td>AI</td>
</tr>
<tr>
<td>ELC3504</td>
<td>English for Effective Workplace Communication</td>
<td>AI</td>
</tr>
<tr>
<td>ENG224</td>
<td>Information Technology</td>
<td>AI</td>
</tr>
<tr>
<td>ENG232</td>
<td>Engineering Science</td>
<td>AI</td>
</tr>
<tr>
<td>ENG236</td>
<td>Computer Programming</td>
<td>AI</td>
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<tr>
<td>ENG237</td>
<td>Basic Electricity and Electronics I</td>
<td>AI</td>
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<tr>
<td>ENG238</td>
<td>Basic Electricity and Electronics II</td>
<td>AI</td>
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<tr>
<td>ENG307</td>
<td>Society and the Engineer</td>
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<tr>
<td>IC2105</td>
<td>Engineering Communication and Fundamentals</td>
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<td>IC2112</td>
<td>IC Training I (EE)</td>
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<tr>
<td>ISE404</td>
<td>Total Quality Management</td>
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<tr>
<td>MM2021</td>
<td>Management &amp; Organisation</td>
<td>AI</td>
</tr>
<tr>
<td>MM4522</td>
<td>China Business Management</td>
<td>AI</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 ethical issues as they arise.
e. Apply appropriate analytical tools for the interpretation of financial statements.

Subject Synopsis/ Indicative Syllabus:

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
<th>Student Study Effort Expected</th>
<th>Reading List and References</th>
</tr>
</thead>
</table>

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

- **Assessment Methods in Alignment with Intended Learning Outcomes**
  - **Continuous Assessment** 50%
    - Project Assignment 10%
    - Tests (close book) 40%
  - **Final Examination** (closed book) 50%
    - Exams (3 hours X 12 topics) and project (10%)

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

- **Reading List and References**
  - **Recommended Textbook**
  - **Recommended References**

Analysis and interpretation of financial statements

- A need for analysis and interpretation of financial statements. Preparation and evaluation of analytical tools for the interpretation of financial statements. Identification and resolution of financial reporting issues.

Understanding accounting concepts and principles

- A need for understanding accounting concepts and principles that underlie the preparation of financial statements.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AF3901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Economics for Engineers</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Exclusion: AF2617</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific assessment methods/tasks</td>
</tr>
<tr>
<td>Continuous Assessment</td>
</tr>
<tr>
<td>1. In-class participation and presentation</td>
</tr>
<tr>
<td>2. Written assignments</td>
</tr>
<tr>
<td>3. Tests</td>
</tr>
<tr>
<td>Final Examination</td>
</tr>
<tr>
<td>Total</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
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AF5107</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Accounting for Engineers</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>5</td>
</tr>
<tr>
<td>Normal Duration</td>
<td>One Semester</td>
</tr>
<tr>
<td>Pre-requisite / Co-prerequisite / Exclusion</td>
<td>None</td>
</tr>
<tr>
<td>Objectives</td>
<td>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.</td>
</tr>
</tbody>
</table>
| Intended Learning Outcomes | Upon completion of the subject, students will be able to: 
  a. Employ the accounting building blocks from the preparers’ perspective. 
  b. Understand accounting information from the users’ perspective and be able to interpret them. 
  c. Appreciate the role of quality accounting information in the decision making process. |
| Subject Synopsis/Indicative Syllabus | **Understanding Accounting**
Why accounting matters. Accounting and its building blocks. The recording process. The accounting information system. The financial statements. Corporate governance, internal control and cash. The application of accounting rules (GAAPs) in general and in particular to receivables and long-lived assets. 

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

**Managerial accounting concepts & techniques**

**Financial Management**

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

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>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>ductor (assignments)</td>
</tr>
<tr>
<td>1. Class Participation (assignments)</td>
<td>5%</td>
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</tr>
<tr>
<td>2. Quiz</td>
<td>30%</td>
<td>√</td>
</tr>
<tr>
<td>3. Individual writing task</td>
<td>15%</td>
<td>√</td>
</tr>
<tr>
<td>Final Examination</td>
<td>50%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

**Student Study Effort Expected**

- **Class contact:**
  - Seminar: 42 Hrs. 

- **Other student study effort:**
  - 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**

<table>
<thead>
<tr>
<th>Subject Description Form</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject Code</strong></td>
</tr>
<tr>
<td><strong>Subject Title</strong></td>
</tr>
<tr>
<td><strong>Credit Value</strong></td>
</tr>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td><strong>Pre-requisite / Co-requisite/ Exclusion</strong></td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td><strong>Intended Learning Outcomes</strong></td>
</tr>
</tbody>
</table>
| **Subject Synopsis/Indicative Syllabus** | *Algebra of complex number:* Complex numbers; Geometric representation; n-th roots of complex numbers.  
*Linear algebra:* Matrices and determinants; Vector space; Elementary algebra of matrices; Eigenvalues and eigenvectors; Normalization and orthogonality.  
*Ordinary differential equations:* First and second order linear ordinary differential equations; Laplace transforms; Convolution theorem; Fourier transforms. |
| **Teaching/Learning Methodology** | The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students’ problem solving ability. |

<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific assessment methods</strong></td>
</tr>
<tr>
<td>a. Continuous Assessment</td>
</tr>
<tr>
<td>b. Examination</td>
</tr>
<tr>
<td><strong>Total</strong></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 level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

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

<table>
<thead>
<tr>
<th>Student Study Effort Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class contact:</strong></td>
</tr>
<tr>
<td>▪ Lecture</td>
</tr>
<tr>
<td>▪ Tutorial</td>
</tr>
<tr>
<td>▪ Mid-term test and Examination</td>
</tr>
<tr>
<td><strong>Other student study effort:</strong></td>
</tr>
<tr>
<td>▪ Assignments and self-study</td>
</tr>
<tr>
<td><strong>Total student study effort</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading List and References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Textbook:</strong></td>
</tr>
<tr>
<td><strong>References:</strong></td>
</tr>
</tbody>
</table>
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AMA202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Mathematics 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>Pre-requisite: Mathematics I (AMA201)</td>
</tr>
</tbody>
</table>

Objectives

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

Intended Learning Outcomes

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

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

Subject Synopsis / Indicative Syllabus

Calculus and functions of several variables:
- Infinite series; Power series; Taylor series; Fourier series; Partial differentiation; Maxima and minima; Lagrange multiplier.

Partial differential equations:
- Formulation of partial differential equations; Method of separation of variables; Initial and boundary value problems.

Vector Calculus:
- Vectors; Scalar and vector products; Gradient, divergence and curl operators; Multiple integrals; Line, surface and volume integrals; Green’s theorem, divergence theorem and Stokes’ theorem.

Teaching / Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Continuous Assessment</td>
<td>40%</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>b. Examination</td>
<td>60%</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>1 2 3 4 5</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 level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

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

Student Study Effort Required

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

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

Total student study effort: 120 Hrs.

Reading List and References

Textbook:
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:

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

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

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

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (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>√ √ √ √ √ √</td>
</tr>
<tr>
<td>3. Final examination</td>
<td>60</td>
<td>√ √ √ √ √ √</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Tutorials</td>
</tr>
<tr>
<td>Other student study effort:</td>
</tr>
<tr>
<td>Test</td>
</tr>
<tr>
<td>Self study and assignment</td>
</tr>
<tr>
<td>Total student study effort</td>
</tr>
</tbody>
</table>

Reading List and References

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

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

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

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

**Subject Code**: CBS2080  
**Subject Title**: Fundamentals of Chinese Communication  
**Credit Value**: 3  
**Level**: 2  

#### Pre-requisite / Co-requisite / Exclusion
- Students whose HKALE result of Chinese Language and Culture is at grade D or below are advised to complete / concurrently take non-credit bearing Chinese Language Enhancement subject(s) as recommended.

#### Objectives
This subject aims to enhance and polish the communication skills of the students in both written Chinese and Putonghua for basic usage in the workplace.

#### Intended Learning Outcomes
- Upon completion of the subject, students will be able to:
  1. **Develop effective communication skills in both written Chinese and Putonghua required for basic usage in the workplace;**
  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.

Students will be required to read and write intensively for enhancing their proficiency level in written Chinese and Putonghua respectively. In the workplace, they will be required to organize their own ideas, concepts in a sensible and logical manner and present them in both written and spoken format for effective transmission of message in given contexts with specific purposes. The mastering of effective communication skills will also facilitate their life-long learning in various disciplines.

#### Subject Synopsis / Indicative Syllabus

<table>
<thead>
<tr>
<th>1. Written Chinese for practical purposes</th>
<th>2. Oral Presentation</th>
<th>3. Final Examination</th>
</tr>
</thead>
</table>
| - Uses of words and sentences;           | - Coherence in Chinese writing and style of expression of official correspondences, publicity materials, reports and proposals; | - General examination emphasis on written and speaking Chinese;
| - Coherence in Chinese writing and style of expression of official correspondences, publicity materials, reports and proposals; | - Context dependency of Chinese writing and style of expression of official correspondences, publicity materials, reports and proposals; | - Q&A on the subject covered in the examination;
| - Context dependency of Chinese writing and style of expression of official correspondences, publicity materials, reports and proposals; | - The flow of speaking Chinese;
| - The flow of speaking Chinese; | - Identification of main idea and key messages; | - Identification of main idea and key messages;
| - Identification of main idea and key messages; | - Identification of main idea and key messages; | - Identification of main idea and key messages;
| - Identification of main idea and key messages; | - Identification of main idea and key messages; | - Skills of seeking clarity and preciseness in answering a question; |
| - Skills of seeking clarity and preciseness in answering a question; | - Skills of seeking clarity and preciseness in answering a question; | - Skills of seeking clarity and preciseness in answering a question; |
| - Skills of seeking clarity and preciseness in answering a question; | - Skills of seeking clarity and preciseness in answering a question; | - Skills of summarizing; |

#### Teaching/Learning Methodology
- The subject will be conducted in Putonghua, in highly interactive seminars. The subject is designed to meet the needs of Chinese language learners at Grade D level in the Hong Kong Diploma of Secondary Education examination. Students are required to demonstrate their understanding of each genre designed for the Putonghua context by practicing writing, presenting and discussing. They will receive formative feedback on their work and engage in class discussions to enhance their writing and presentation skills.

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

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Intended Learning Outcomes</th>
<th>% Weighting</th>
<th>Specific assessment methods/tasks</th>
</tr>
</thead>
</table>
| 1. Written Assignment | a. Develop effective communication skills in both written Chinese and Putonghua; b. Master the format, organization, language and style of expression of various genres of Chinese practical writing such as official correspondences, publicity materials, reports and proposals; c. Give formal presentation in Putonghua; d. Engage with formal discussion in Putonghua. | 30% | → 

#### Reading List
<table>
<thead>
<tr>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>邵守義 (1991) 《演講全書》，吉林人民出版社。</td>
</tr>
<tr>
<td>鄭建民 (1994) 《說話的藝術》，語文出版社。</td>
</tr>
<tr>
<td>李軍華 (1996) 《口才學》，華中理工大學出版社。</td>
</tr>
<tr>
<td>陳瑞瑞著 (2000) 《生活錯別字》，中華書局。</td>
</tr>
<tr>
<td>邢福義、汪國勝主編 (2003) 《現代漢語》，華中師範大學出版社。</td>
</tr>
<tr>
<td>于成鯤主編 (2003) 《現代應用文》，復旦大學出版社。</td>
</tr>
<tr>
<td>鍾文佳 (2004) 《漢語口才學》，西南師範大學出版社。</td>
</tr>
<tr>
<td>李白堅、丁迪蒙 (2004) 《大學體型寫作訓練規程》，上海大學出版社。</td>
</tr>
<tr>
<td>于成鯤、陳瑞瑞、秦扶一，金振邦編 (2011) 《當代應用文寫作規範叢書》，復旦大學出版社。</td>
</tr>
</tbody>
</table>
CSE508

Environmental Impact Assessment

3

5

Recommended background knowledge:
Engineering or applied science undergraduate background.

To provide students with an overview and understanding of the principles and current practices of environmental impact assessment (EIA). In particular, emphasis will be placed on environmental impact assessment studies relevant to Hong Kong.

Upon completion of the subject, students will be able:
1. to conduct EIA studies in a team;
2. to perform environmental monitoring work within the EIA cycle;
3. to critically comment EIA reports and other related documents;
4. to be able to analyse complex environmental issues and to seek the best possible practical solutions for large infrastructural development project; and
5. to understand the relationship among project EIA, Strategic Environmental Assessment (SEA) and sustainable development.

Keyword syllabus:
- Development of Environmental Impact Assessment
  Historical review. Environmental assessment development in the world and Hong Kong.
- Scope and Objectives of Environmental Impact Assessment
  Environmental considerations: land use, planning, development and management. EIA aims and objectives. Environmental assessment and sustainable development.
- Methodology and Assessment Techniques
- Monitoring and Baseline Studies
  Environmental effects. Baseline studies requirements. Special field studies. Environmental monitoring and audit.
  Air, water, ecological, socioeconomic, visual, risk impact assessments. Environmental quality and regulatory requirements. Mitigation and control measures.
- Environmental Impact Statement
- Case Studies
  Selected case studies on the EIA of infrastructure and other development projects.

The subject teaching will include the following elements:
- Lectures – to introduce the basic concepts and assessment methods;
- Tutorials – to answer student questions in the learning processes;
- Group discussion and presentations – to let students play different roles in the EIA process;
- Reading materials and video presentations – to give students examples in local EIA case studies;
- Seminars on EIA practices by invited speakers from government agencies and professional environmental consultants; and
- Course work and term project (individual cases study) on EIA in Hong Kong.

Specific assessment methods/tasks

<table>
<thead>
<tr>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous Assessment</td>
<td>50%</td>
</tr>
<tr>
<td>2. Written Examination</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

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


**Subject Description Form**

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

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

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

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

**Subject Synopsis/Indicative Syllabus**

**i) Fundamentals of Urban 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.

**ii) Travel Demand and Data Collection**
The spatial characteristics; temporal characteristics; Hong Kong travel demand characteristics. Data collection and preparation; travel surveys and transportation system inventory.

**iii) Travel Demand Analysis**
Model development; nature of modelling errors. Four step models: trip generation; trip distribution; modal split; traffic assignment. Simplified approach to small area planning.

**iv) Urban Transport Technology**
Evaluation of urban transport technology; classification of urban transport technologies; urban transport networks; examples of urban transport systems, traffic restraint and road pricing, intelligent transport systems, route guidance and traveller information systems.

**v) Generation and Evaluation of Solutions**

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

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

<table>
<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. Continuous Assessment</td>
<td>40%</td>
<td>√ a. √ b. √ c. √ d.</td>
</tr>
<tr>
<td>2. Written Examination</td>
<td>60%</td>
<td>√ a. √ b. √ c. √ d.</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:**
Continuous assessment will be based on coursework and case study discussions.
Written examination is evaluated by final examination.
Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

**Reading List and References**

**Textbooks**
**Reference Books**


Sheffi, Yosef, *Urban Transportation Networks*, Prentice-Hall (1985). The official link from MIT:


**Conference Proceedings and Symposia**

Proceedings of Hong Kong Society for Transportation Studies (http://home.netvigator.com/~hksts)

Proceedings of the International Symposium on Transportation and Traffic Theory

**Journals**

Journal of Advanced Transportation

Journal of the Transportation Research Board

Journal of Transportation Engineering, American Society of Civil Engineers (ASCE)

Traffic Engineering and Control

Transportation Planning and Technology

Transport Policy

Transportation Research

Transportation Science

Transportmetrica

**Reports**

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

Transportation Research Records, Transportation Research Board

TRRL reports, Transport and Road Research Laboratory
SUBJECT DESCRIPTION FORM

Subject Title: Applied Electromagnetics

Subject Code: EE2011

Number of Credits: 3

Pre-requisite: Nil
Co-requisite: Nil
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 Subject Learning Outcomes:
1. Understand that electromagnetism is based on Maxwell’s equations. Interpret the physical meaning and phenomena behind Maxwell’s equations. Know the meanings of physical quantities of electromagnetism and their basic relationships.
2. Be able to analyse electromagnetic phenomena related to electrical engineering systems by selecting the most appropriate laws/theorems/solution techniques.
3. Appreciate recent developments in computational electromagnetics.
4. Have had hands-on experience in electromagnetic measurements.

Syllabus:
1. Mathematical preliminaries: Vector analysis and coordinate systems. The operators grad, div and curl. Concept of line, surface and volume integrals. Stokes’s and divergence theorems.
3. Time-varying fields: Faraday’s law and Lenz’s law; self-inductance, mutual inductance and stored energy.

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

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

Assessment Methods:

<table>
<thead>
<tr>
<th>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>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>2. Class Test</td>
<td>24%</td>
<td>1, 2</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>16%</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Required:

<table>
<thead>
<tr>
<th>Class activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
<td>36</td>
</tr>
<tr>
<td>Laboratory</td>
<td>12</td>
</tr>
<tr>
<td>Other student study effort</td>
<td></td>
</tr>
<tr>
<td>Laboratory preparation/report</td>
<td>12</td>
</tr>
<tr>
<td>Self-study</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
</tr>
</tbody>
</table>

Reference books:
## Subject Description Form

### Subject Code
E10101

### Subject Title
Analogue and Digital Circuits

### Credit Value
3

### Pre-requisite/ Corequisite
Pre-requisite: ENG237 & ENG238

### Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Intended Learning Outcomes</th>
<th>Content Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design basic digital combinational and sequential circuits and list the detail procedures and possible difficulties.</td>
<td>Digital Circuits</td>
</tr>
<tr>
<td>2. Given the requirements of an application, justify the use of suitable A/D or D/A converters and match the properties to serve the purposes of different applications.</td>
<td>Digital Circuits</td>
</tr>
<tr>
<td>3. To enable students to analyse the operation principles of different A/D and D/A approaches and the need for organised preparation and teamwork.</td>
<td>Digital Circuits</td>
</tr>
<tr>
<td>4. To enable students to appreciate the limitations of circuit design from practical viewpoints and the need for sound technical knowledge and teamwork.</td>
<td>Digital Circuits</td>
</tr>
<tr>
<td>5. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.</td>
<td>Large-signal transistor circuits</td>
</tr>
<tr>
<td>6. To enable students to analyse and design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.</td>
<td>Large-signal transistor circuits</td>
</tr>
<tr>
<td>7. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.</td>
<td>Signal conversion</td>
</tr>
<tr>
<td>8. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.</td>
<td>Signal conversion</td>
</tr>
</tbody>
</table>

### Subject Synopsis/ Indicative Syllabus

#### Digital Circuits
1. Introduction to digital logic and number systems. Logic gates and families. The design process, power dissipation and functional verification of digital systems.
2. Gate level design using logic gates. Implementation of digital logic gates and simple digital circuits using basic and advanced logic gates.

#### Large-signal transistor circuits

#### Signal conversion
1. 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-slope converter.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Methods/tasks</th>
<th>Specific assessment methods/tasks</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>-</td>
<td>1. To familiarise students with the characteristics and operation of analogue and digital circuits</td>
</tr>
<tr>
<td>Class Test</td>
<td>12%</td>
<td>-</td>
<td>2. To enable students to understand the common techniques used in circuit design for operation and design principles</td>
</tr>
<tr>
<td>Laboratory performance &amp; reports</td>
<td>16%</td>
<td>-</td>
<td>3. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.</td>
</tr>
<tr>
<td>Mini-project &amp; report</td>
<td>12%</td>
<td>-</td>
<td>4. To enable students to analyse the operation principles of different A/D and D/A approaches and the need for organised preparation and teamwork.</td>
</tr>
<tr>
<td>Self-study</td>
<td></td>
<td>-</td>
<td>5. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.</td>
</tr>
</tbody>
</table>

### Teaching/ Learning Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Content Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and tutorials</td>
<td>Analogue and Digital Circuits</td>
</tr>
<tr>
<td>Experiments</td>
<td>Analogue and Digital Circuits</td>
</tr>
<tr>
<td>Interactive laboratory sessions</td>
<td>Analogue and Digital Circuits</td>
</tr>
</tbody>
</table>

### Student Study Effort Expected

Total student study effort: 105 Hrs.

### Textbook

### Reading List and References


### Subject Exclusion
No subject exclusion.

### Specifics

- Subject Description Form
- Teaching/Learning Methodology
- Assessment Methods in Alignment with Intended Learning Outcomes
- Teaching/Learning Methodology
- Subject Study Effort Expected
- Textbook
- Reading List and References
### Subject Description Form

#### Subject Code
EE3021

#### Subject Title
Electromechanical Energy Conversion

#### Credit Value
3

#### Level
3

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

### Objectives

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

### Intended Learning Outcomes

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

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

### Subject Synopsis/Indicative Syllabus

1. **Introduction**
   - Principles of motors and generators.
   - Materials for electric machines.
   - Types of electric machines and applications.
   - Losses and efficiency.

2. **Machine Rating**
   - Temperature rise and cooling methods.
   - Heating and cooling curves.
   - Thermal ratings.
   - Machine nameplate.

3. **Transformers**
   - Operating principles.
   - Equivalent circuits.
   - Voltage regulation and efficiency.
   - Parallel operation.
   - Three-phase transformers and phase grouping.

4. **Windings**
   - Phase and commutator windings.
   - Winding factors.
   - E.m.f. equation.
   - Harmonics.
   - Production of rotating field.

5. **D.C. Machines**
   - Construction.
   - E.m.f. equation.
   - Armature reaction and commutation.
   - Characteristics of shunt, series and compound machines.
   - Testing.
   - Speed control.
   - Universal motor.
   - Brushless d.c. motor.

6. **Synchronous Machines**
   - Construction.
   - Synchronous impedance.
   - Voltage regulation.
   - Synchronising.
   - Performance on infinite busbars.
   - Power/load angle relationship.
   - Stability.
   - Synchronous motor.

7. **Induction Machines**
   - Squirrel cage and wound-rotor types.
   - Equivalent circuit.
   - Torque-slip relationship.
   - Starting, braking and generating.
   - Testing.
   - Speed control.
   - Single-phase induction motors.

### Laboratory Experiments

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

### Teaching/Learning Methodology

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

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Laboratory work</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>20%</td>
<td>30%</td>
<td>10%</td>
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</table>

### Assessment Methods in Relation with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>a, b, c, d</td>
</tr>
<tr>
<td>Laboratory work and reports</td>
<td>20%</td>
<td>a, b, c, d</td>
</tr>
<tr>
<td>Assignment</td>
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<td>a, b, c, d</td>
</tr>
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</table>

Total 100%

### 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 work and reports</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Assignment</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
</tbody>
</table>

Total 100%

### Reading List and References

Subject Description Form

**Subject Code**: EE3031

**Subject Title**: Power Electronics and Drives

**Credit Value**: 3

**Level**: 3

**Pre-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:
   1. DC to DC conversion
   2. AC to DC conversion
   3. DC to AC conversion

### Subject Synopsis/Indicative Syllabus

1. Power electronics fundamentals: power conversion, energy balance principle, review of fundamentals, power semiconductor devices, power switches, semiconductor switches, AC to DC conversion, DC to AC conversion.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>% Weighting</th>
<th>Intended Subject Learning Outcomes to Be Assessed</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
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<td>Tutorials</td>
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</tr>
<tr>
<td>Laboratory</td>
<td>10%</td>
<td>a, b, c</td>
</tr>
</tbody>
</table>

### Laboratory Works

1. To supplement the lecture materials.
2. To add real experience for the students.
3. To provide deep understanding of the subject.
4. To enable students to organize principles and challenge ideas.

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Laboratory</th>
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<tbody>
<tr>
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</tr>
<tr>
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<td>√</td>
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<td>√</td>
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<tr>
<td>3</td>
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</table>

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific Assessment Method</th>
<th>% Weighting</th>
<th>Intended Subject Learning Outcomes to Be Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Examination</td>
<td>60%</td>
<td>a, b, c</td>
</tr>
<tr>
<td>b) Class tests</td>
<td>30%</td>
<td>a, b, c</td>
</tr>
<tr>
<td>c) Laboratory performance &amp; reports</td>
<td>10%</td>
<td>a, b, c</td>
</tr>
</tbody>
</table>

### Subject Study Effort

| Class contact: Lecture/Tutorial | 36 Hrs. |
| Class contact: Laboratory       | 12 Hrs. |
| Other student study effort:     | 45 Hrs. |

### Total student study effort

105 Hrs.

### Reading List and References

## Subject Description Form

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

### Objectives
1. To 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.
2. To 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.
3. To be able to work in teams when conducting laboratory investigations.
4. To be able to write a technical report and present the findings.

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

### Subject Synopsis/Indicative Syllabus
1. **Generation, energy and environment:** Renewable and non-renewable resources and generation. Pump storage and wind turbine. Sources of pollution and environmental impacts.
2. **Power system components:** Busbar, Turbine and generator system. Concept of generation control and operating chart. Power Transformers. Line and Cable: RLCG and ABCD parameters and applications.
4. **Surge:** 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.
- Symmetrical and Asymmetrical fault using interactive package “Powerworld”.
- Symmetrical components.
- Effects of different earthing methods in distribution system.
- Grading of overcurrent relays.

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

<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</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a, b</td>
</tr>
<tr>
<td>2. Class Test</td>
<td>25%</td>
<td>b, c</td>
</tr>
<tr>
<td>3. Laboratory Performance &amp; Report</td>
<td>15%</td>
<td>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.

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

### Reading List and References
- **Textbooks:**
  2. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill, 4th Edition or later, 1982 or later
- **Reference Books:**
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Systems and Control</td>
</tr>
<tr>
<td>Credit Value</td>
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<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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Experiments</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Tutorials</td>
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<tr>
<td>Experiments</td>
<td>√</td>
<td>√</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. Class tests</td>
<td>30%</td>
<td>√ √</td>
</tr>
<tr>
<td>3. Laboratory reports</td>
<td>10%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Subject Description Form

Subject Code: EE3061
Subject Title: Analysis Methods for Engineers
Credit Value: 3
Level: 3
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: AMA201

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

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

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

Subject Synopsis/Indicative Syllabus:
2. Probability & statistics: Random variables, probability distributions, sample distributions and means, Central Limit Theorem, significance and hypothesis testing, stochastic processes.
3. Optimisations: Direct search and simple gradient methods; optimisations with constraints.
4. Operations research: Linear programming, simple Simpex algorithms, sensitivity analysis, shortest path and maximum flow problems, integer programming, combinatorial optimisation problems, applications in power systems and transportation.

Laboratory Experiments:
Analysis of errors in numerical algorithms through Matlab
Numerical evaluation of Laplace solution of voltage distribution in insulated container
Sensitivity analysis and performance in electrical systems

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

Assessment Methods 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 e
2. Tests | 20% | a b c d e
3. Assignments & class works | 10% | a b c d e
4. Laboratory performance & reports | 10% | a b c d e
Total | 100% | a b c d e

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

Student Study Effort Expected:
Class contact:
- Lecture/Tutorial: 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:
Textbooks:
2. F.S. Hillier, Introduction to operations research, McGraw Hill, 2005

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE3111</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Project Methodologies</td>
</tr>
<tr>
<td>Credit Value</td>
<td>2</td>
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<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Objectives
1. To 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>Lectures</th>
<th>Outcomes</th>
</tr>
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<tbody>
<tr>
<td>a</td>
<td>b</td>
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</table>

Writing Project Proposal

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

<table>
<thead>
<tr>
<th>2. Project Proposal Writing 90%</th>
<th>v</th>
<th>v</th>
<th>v</th>
<th>v</th>
</tr>
</thead>
</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:

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Lecture/Tutorial</th>
<th>Lab</th>
<th>Experiments</th>
<th>Class Test</th>
<th>Exam</th>
<th>Other</th>
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<td>10%</td>
<td>10%</td>
<td>15%</td>
<td>10%</td>
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### Assessment Methods in Alignment with Intended Outcomes

#### Student Study Effort Expected

- Lectures/Tutorial: 36 Hrs.
- Laboratory: 12 Hrs.
- Self-study: 45 Hrs.
- Other student effort: 18 Hrs.
- Total student study: 105 Hrs.

### Intended Outcomes

1. To enable students to establish a broad knowledge of the organization and components of computer systems, including: Processor organization and architecture, Memory hierarchy and addressing, Input and output systems, Microprocessor hardware and interfacing.
2. To enable students to understand and apply assembly language programming.
3. To enable students to develop a simple embedded computer system.
4. To think logically and be able to present results in writing.

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Subject Synopsis/Indicative Syllabus</th>
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<tr>
<td>EEE21</td>
<td>Assembly Language Programming</td>
<td>Computer Systems Principles, Microprocessor organization and architecture, Memory hierarchy and addressing, Input and output systems, Microprocessor hardware and interfacing.</td>
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### Reading List and References

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>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

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

Intended Learning Outcomes
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)

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td></td>
</tr>
<tr>
<td>Tutorials</td>
<td></td>
</tr>
<tr>
<td>Experiments</td>
<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</td>
</tr>
<tr>
<td>2. Test</td>
<td>25%</td>
<td>a, b</td>
</tr>
<tr>
<td>3. Laboratory</td>
<td>10%</td>
<td>a, c</td>
</tr>
<tr>
<td>4. Home work or in-class exercises</td>
<td>5%</td>
<td>a, c</td>
</tr>
<tr>
<td>Total</td>
<td>100%</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.

<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lecture/Tutorial 39 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Laboratory 6 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td>Laboratory preparation/report 12 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Self-study 48 Hrs.</td>
</tr>
<tr>
<td>Total student study effort</td>
<td>105 Hrs.</td>
</tr>
</tbody>
</table>

Reading List and References

Reference books:
2. B.P. Lathi, Modern Digital and Analogue Communication Systems, Oxford University Express, 2009
Subject Description Form

**Subject Code**: EE321

**Subject Title**: Electrical Services in Buildings

**Credit Value**: 3

**Level**: Nil

**Pre-requisite/Exclusion**: Nil

**Objectives**:
1. To enable students to understand the major design features, operating characteristics and distribution, lighting protection, vertical transportation, lighting and fire fighting systems.
2. To enable students to implement technical data, regulations, standards and guidance notes prepared by statutory bodies in the design of reliable, safe and efficient electrical power distribution, lightning protection, vertical transportation, lighting and fire fighting systems in buildings.
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 design and evaluate the effectiveness of lightning protection systems.
5. To enable students to integrate the lighting requirements and operating characteristics of light sources to the design of interior lighting and exterior lighting.
6. To enable students to search for information in solving technical problems.

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

1. Examination 60%
2. Class Test/Quiz 25%
3. Mini-project & report 15%

**Total 100%**

**Assessment Specific methods and scales**

- **Examination**: 40%
- **Class Test/Quiz**: 30%
- **Mini-project & report**: 30%

**Subject Synopsis/Indicative Syllabus**

**1. Power distribution in buildings**: System planning. Incoming supply arrangement for domestic, commercial and industrial buildings. Applications of high voltage, medium voltage and low voltage distribution, lighting protection, vertical transportation, lighting and fire fighting systems.

**2. Interference and power quality**: Suppression and power supply in communication systems. Electromagnetic compatibility. Harmonics and voltage dips issues.


**4. Fire Fighting Systems**: Outline, regulations, requirements and components of fire fighting systems. Fire sprinkler systems. Heat and smoke detector systems. BTM/BCF systems.

**5. Distribution systems for typical buildings in Hong Kong**: Distribution system design for typical buildings in Hong Kong.

**6. Electrical power quality issues in building services**: Understanding and managing power quality issues in building services.

**7. Lighting protection systems**: Designing and installing lightning protection systems for various types of buildings.

**Evaluation methods and scales**

- **Examination**: 40%
- **Class Test/Quiz**: 30%
- **Mini-project & report**: 30%

**Total student study effort 105 Hrs.**

**Other student study effort**

- **Lecture/Tutorial**: 42 Hrs.
- **Self-study**: 43 Hrs.

**Total student study effort 105 Hrs.**

**Textbooks and Reference Books**


**Case Study**

1. Distribution system design for a typical building in Hong Kong: Case study on the design and installation of a typical building's electrical distribution system.
2. Co-ordination of various types of protective devices: Understanding the co-ordination of various types of protective devices in electrical systems.
Collection: students collect relevant artifacts produced for the employer during the work term and/or from company interviews etc. into the learning portfolio.

Examples of valid WIE activity:
- Relevant placement as student helpers in PolyU administrative departments and the Industrial Centre.
- Assistance 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.

Upon completion of the subject, students will be able to:
- Develop and deliver a learning portfolio for presenting learning experiences and outcomes.
- Demonstrate the awareness of the practical contexts in engineering.
- Appreciate the work of others in an industrial/engineering working.
- Develop a resourceful and speculative approach in making contacts and sourcing information.
- Demonstrate good working practices to show a developing maturity and sense of responsibility.

In order to complete their formal education, students are required to undertake a placement for a specified period of time. Relevant placements are those that involve external organizations, jobs undertaken by the Industrial Centre as a service for an external organization.

Upon a student's completion of the subject, he/she will be able to:
- Develop and deliver a learning portfolio for presenting learning experiences and outcomes.
- Demonstrate the awareness of the practical contexts in engineering.
- Appreciate the work of others in an industrial/engineering working.
- Develop a resourceful and speculative approach in making contacts and sourcing information.
- Demonstrate good working practices to show a developing maturity and sense of responsibility.

Teaching/Learning Methodology:

(II) Progress Monitoring
- Students should maintain a weekly training journal to identify their actual responsibilities.
- Students should maintain a weekly training journal to identify their actual responsibilities.
- Students should maintain a weekly training journal to identify their actual responsibilities.
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Assessment Method in Alignment with Intended Learning Outcomes:

- 1. Learning Portfolio 80%
- 2. Placement Questionnaire 20%

The intended subject learning outcomes to be assessed by means of student learning portfolios as well as questionnaire to industrial supervisors.

Different students and their industrial supervisors are expected to submit a learning portfolio about the work term experience. It provides an opportunity for the student to reflect upon the work term experience and to gain valuable feedback from their industrial supervisors.

Teaching/Learning Methodology Outcomes:

1. To give the student an exposure to the industrial/engineering working environments before they complete their formal education.
2. To provide the student with the opportunity to undertake practical training.
3. To enable the student to develop and deliver a learning portfolio.
4. To facilitate the student's learning of the practical contexts in engineering.
5. To enhance the student's appreciation of the work of others in an industrial/engineering working.
6. To develop the student's resourceful and speculative approach in making contacts and sourcing information.

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<table>
<thead>
<tr>
<th>Specific Assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Class work</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Laboratory report</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></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:

- Analyse the stability, transient response and steady-state response of sampled-data systems.
- Design digital controllers for sampled-data systems.
- Analyse discrete-time signals and extract features using different digital signal processing techniques.
- Design a range of FIR and IIR filters.
- Write technical reports and present the findings.

### Subject Synopsis/Indicative Syllabus

1. **Stability and transient analysis:** Sampling and z-transform, Sampled-data systems, Stability of closed-loop systems, Transient and steady state responses.
2. **Digital control design:** Translation of analogue design to digital design, Designs based on frequency response methods, Analytical design method.
3. **Design in state space:** Controllability, Observability, Pole placement, State observer, Output feedback, Servo problem.
4. **Digital filters:** Forms of realization, Design of nonrecursive and recursive filters, Finite word length effect.
5. **Spectrum analysis:** DFT, FFT, Power spectrum, Windowing, Computation of convolution and correlation, Estimation of signal in noise.

### Teaching/Learning Methodology

- **Lectures and tutorials** are the primary means of conveying the basic concepts and information. The students are encouraged to take notes and to look for relevant information.
- **Experiments** involve practical work on digital controllers, digital signal analysis, and filter design.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessed Learning Outcomes</th>
<th>Lectures/Tutorial</th>
<th>Laboratory</th>
<th>Self-study</th>
<th>Other student study effort:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>30%</td>
<td>10%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>30%</td>
<td>10%</td>
<td>50%</td>
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<tr>
<td>c</td>
<td>30%</td>
<td>10%</td>
<td>40%</td>
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<tr>
<td>e</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Assessment methods/tasks

- **Examination:** 60% (38 Hrs.)
- **Class work:** 10% (8 Hrs.)
- **Laboratory:** 10% (8 Hrs.)
- **Self-study:** 60% (47 Hrs.)

### Total student study effort: 105 Hrs.

### Reading List and References


### 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.

### Reading List and References

- **Reference books:**
SUBJECT DESCRIPTION FORM

Subject Title: Electrical Machines  
Subject Code: EE4021  
Number of Credits: 3

Pre-requisite: EE3021  
Co-requisite: Nil  
Exclusion: Nil

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 Subject Learning Outcomes:
1. Have acquired a good understanding of the basic design methods of electric machines.
2. Have had experience in synchronous machines including load characteristics, oscillations equations, and displacement stability.
3. Be able to analyse the unbalanced and dynamic operation.
4. Be able to understand the drives for induction machines and their harmonics analysis for drives. Be aware of various switched-mode driven machines.
5. Be capable to understand the control method for induction machines including closed loop and vector control.

Syllabus:
2. Appreciation of machine design: Appreciation of basic technological factors, Winding design.
3. Synchronous machines: Load characteristics of isolated generator, Linearized equations of small oscillations, Natural frequency.
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 Methodologies:
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.

Assessment Methods:

<table>
<thead>
<tr>
<th>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>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Class Test</td>
<td>24%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Mini-project &amp; report</td>
<td>16%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Required:

<table>
<thead>
<tr>
<th>Class activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
<td>36</td>
</tr>
<tr>
<td>Laboratory/Mini-project</td>
<td>12</td>
</tr>
<tr>
<td>Other student study effort</td>
<td>12</td>
</tr>
<tr>
<td>Mini-project/report</td>
<td>12</td>
</tr>
<tr>
<td>Self study</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
</tr>
</tbody>
</table>

Reference books:
2. C.V. Jones, The Unified Theory of Electrical Machines, Butterworths, 1967
Subject Description Form

Subject Code: EE4031
Subject Title: Power Systems
Credit Value: 3
Level: 4

Pre-requisite/Co-requisite/Exclusion:
Pre-requisite: EE3041

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

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

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

Subject Synopsis/Indicative Syllabus:

Laboratory Experiment:
Power system load flow and security operation simulation of sample power system. Transient stability assessment of power system.

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

Assessment Methods in Alignment with Intended Learning Outcomes:

1. Examination 60%  √  √  √
2. Laboratory performance & report 15%  √  √  √
3. Mini-project & report 15%  √  √  √  √
4. Class test 10%  √  √

Total 100%

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

Student Study Effort Expected:
Class contact:
- Lecture/Tutorial 38 Hrs.
- Laboratory 8 Hrs.

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

Total student study effort 105 Hrs.

Reading List and References:
1. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill

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

Specific assessment methods/tasks % weighting

- 1. Examination 60%  √  √  √
- 2. Laboratory performance & report 15%  √  √  √
- 3. Mini-project & report 15%  √  √  √  √
- 4. Class test 10%  √  √

Intended subject learning outcomes to be assessed:

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
</tr>
</thead>
</table>
| 1. Examination 60%  √  √  √
| 2. Laboratory performance & report 15%  √  √  √
| 3. Mini-project & report 15%  √  √  √  √
| 4. Class test 10%  √  √ |
| Total 100% |
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4041</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Engineering Project Management</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Exclusion: LGT3019</td>
</tr>
</tbody>
</table>

#### Objectives

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

#### Intended Learning Outcomes

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

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

#### Subject Synopsis/Indicative Syllabus

1. **Engineering project definitions and stages:** Characteristics of engineering projects. Life cycle models. Strategic and tactical issues. Factors affecting the success of project management.
3. **Project screening and selection:** Check list and scoring models. Benefit-cost analysis. Cost effectiveness analysis.

#### 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.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>√</td>
</tr>
<tr>
<td>Tutorials</td>
<td>√</td>
</tr>
<tr>
<td>Mini-project</td>
<td>√</td>
</tr>
</tbody>
</table>

#### Assessment Methods

- Specific assessment
- % Intended subject learning outcomes to

### Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>methods/tasks</th>
<th>weighting</th>
<th>be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>√</td>
</tr>
<tr>
<td>2. Class test</td>
<td>20%</td>
<td>√</td>
</tr>
<tr>
<td>3. Mini-project and report</td>
<td>20%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

#### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial: 42 Hrs.
  - Self-study: 50 Hrs.
  - Mini-project and report: 13 Hrs.

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

#### Reading List and References

**Reference books:**

At the middle of the project period, each student has to submit an Interim Report to summarise their progress to date. The report will be submitted to the subject coordinator for assessment. Each student is required to submit a report initially 6 weeks before the assessment date. The report will be assessed against the following criteria:

- The report should be submitted on time.
- The report should be well-structured and clearly written.
- The report should demonstrate the student's understanding of the project.
- The report should include a clear problem statement.
- The report should include a literature review.
- The report should include an initial problem identification.

The report will be assessed by the subject coordinator, who will provide feedback to the student.

The final project report will be submitted at the end of the project period. The report should be submitted in the following format:

- The report should be submitted on time.
- The report should be well-structured and clearly written.
- The report should demonstrate the student's understanding of the project.
- The report should include a clear problem statement.
- The report should include a literature review.
- The report should include an initial problem identification.

The report will be assessed by the project supervisor, the independent examiner, and the chairman of the assessment panel. The assessment panel will reach a consensus on the final grade to be awarded to the project.

The final grade will be derived from the following aspects:

- Intellectual achievement:
- Depth of understanding of the topic and the relevant allied topics;
- Quantity and quality of work done, including design and construction of equipment, experimentation, mathematical models, program writing, verification;
- Presentation including the written report, seminar presentation and response to questions.

In assessing the project, the panel will consider, normally with equal weight, the following aspects:

- a. Intellectual achievement;
- b. Depth of understanding of the topic and the relevant allied topics;
- c. Quantity and quality of work done, including design and construction of equipment, experimentation, mathematical models, program writing, verification;
- d. Presentation including the written report, seminar presentation and response to questions.

The chairman will ensure that all aspects of the study are thoroughly discussed by the panel. In arriving at their decision, the panel will bear in mind their experiences in respect of the achievements in other projects in the department in the current and previous years.
The Final Project Report

The final project report should contain all the work carried out by the student in the project. The report should be structured as follows:

A. Aims of the project
B. Proposed specifications of the product (no matter it is a hardware or software project)
C. Summary of work done in the project
D. System architecture, the block diagram of the system, plus some brief descriptions on the theory
E. Time table / schedule of your work of the entire project
F. Test and simulation results
G. Confusions encountered during the project
H. The achievement of the project, the conclusions from the work and suggestions for further work
I. Materials which are closely related to the contents of the report, and which are not covered in the report
J. A list of the references referred to from the source of information in the report

Assessment Criteria:

1. Problem identification
2. Conceptual accuracy and clarity
3. Technical application
4. Literature research
5. Writing quality

Overall Assessment: 20 % Continuous Assessment

The Final Report will contribute to 40% of the final grade.

Formal Project Proposal

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

The contents of the proposal should include:

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

Assessment Criteria:

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

Interim Report

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 contents of the report should include:

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

Assessment Criteria:

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

Final Project Report

The final project report should contain all the work carried out by the student in the project. The report should be structured as follows:

A. Aims of the project
B. The motivation behind the project and a brief outline of the project work
C. A summary of work done or developed in the project (not work done by others)
D. The system design and the block diagram of the system, plus some brief descriptions on the theory
E. Testing and simulation results
F. Difficulties encountered during the project
G. The achievement of the project, the conclusions from the work and suggestions for further work
H. Materials which are closely related to the contents of the report, and which are not covered in the report
I. A list of the references referred to from the source of information in the report
J. Materials which are closely related to the contents of the report, and which are not covered in the report

Assessment Criteria:

1. Problem identification
2. Conceptual accuracy and clarity
3. Technical application
4. Literature research
5. Writing quality

Presentation and Demonstration

The student should keep the presentation concise and interesting, and appropriate control of the pace. Show good mastering of topics and avoid undue pauses. The student should be able to answer questions elicited from the audience during the presentation. The student should show good mastering of topics during the question session of the presentation by providing satisfactory answers to questions.

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

Assessment Criteria:

1. Problem identification
2. Conceptual accuracy and clarity
3. Technical application
4. Literature research
5. Writing quality
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>x</td>
</tr>
<tr>
<td>Wiring of the project proposal</td>
<td>x</td>
</tr>
<tr>
<td>Writing of the interim report</td>
<td>x</td>
</tr>
<tr>
<td>Writing of the final report</td>
<td>x</td>
</tr>
<tr>
<td>Presentation and demonstration</td>
<td>x</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>√ a b c</td>
</tr>
<tr>
<td>2. Interim progress report</td>
<td>15%</td>
<td>√ a b</td>
</tr>
<tr>
<td>3. Final report</td>
<td>50%</td>
<td>√ a b c</td>
</tr>
<tr>
<td>4. Presentation and demonstration</td>
<td>30%</td>
<td>√ a b</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

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>5 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Briefings</td>
<td></td>
</tr>
<tr>
<td>Individual Discussions with supervisor</td>
<td>~15 Hrs.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisite: EE3031</td>
<td>Specific Assessment methods (%)</td>
</tr>
<tr>
<td>1. Examination</td>
<td>60%</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>20%</td>
</tr>
<tr>
<td>3. No attendance assignments</td>
<td>20%</td>
</tr>
<tr>
<td>4. Laboratory preparation/report</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### Subject Synopsis/Indicative Syllabus

1. **Pulse-Width-Modulated DC/DC converters**: Basic topologies and higher order models of operation, ripple analysis and digital simulation using mixed-mode circuit and electromagnetic interference (EMI) analysis software and experience with parasitic components and snubbers.
2. **Resonant Mode DC/DC converters**: Zero-current switching and zero-voltage switching, quasi-resonant converter, resonant inductor, and resonant current mode inverters.
3. **Control and C/A for power electronics**: Small-signal model and control, analog and digital simulation, and mixed-mode simulation.
5. **Electromagnetic interference**: EMI filter, International Standards, and Reduction of EMI.

#### Key Points
- To provide the students with the knowledge of advanced power electronic converters, transformation, topology, and control methods.
- To ensure the students having an in-depth understanding of the design and control of various power electronics converters.
- To present the results of study in the form of simulations and analysis.
- To encourage students to organise principles and challenge ideas.

#### Subject Title
Advanced Power Electronics

#### Subject Code
EE4211

#### Credit Value
3

#### Level
4

#### Subject Synopsis

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.

#### Exemptions

- Pre-requisite: EE3031

#### Additional Information

- Lecture/Tutorial: 38 Hrs.
- Laboratory: 8 Hrs.
- Laboratory preparation/report: 12 Hrs.
- Self-study: 47 Hrs.
- Total student study effort: 107 Hrs.

#### Reading List and References


#### Effort Expected

- Lecture/Tutorial: 38 Hrs.
- Laboratory: 8 Hrs.
- Laboratory preparation/report: 12 Hrs.
- Self-study: 47 Hrs.
- Total student study effort: 107 Hrs.
Subject Description Form

**Subject Code**: EE4221  
**Subject Title**: Applied Digital Control  
**Credit Value**: 3  
**Level**: 4  
**Pre-requisite**: EE3051

### Objectives

1. To facilitate a working knowledge of principles of reduced-order modelling, digital control algorithms, system identification, and adaptive control.
2. To enable students designing industrial control systems for applications in different engineering areas.

### Intended Learning Outcomes

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

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

### Subject Synopsis/Indicative Syllabus

1. **Process control**:
   - Deadbeat control, Finite-settling time control, Dead-time compensation, Internal model control.

2. **Direct digital control algorithms**:
   - Modified z-transform, PID algorithm, Cascade control, Predictive control, Adaptive control: Introduction to adaptive control, Self-tuning controllers.

3. **Computer control methods**:
   - Hierarchical control configurations, Distributed control, System identification by correlation, principle of least squares, Recursive least squares, Self-tuning control.
   - Introduction to adaptive control: Self-tuning control.

### 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 findings to the class.

### Reading List and References

Reference books:

### 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>Class test</td>
<td>20%</td>
<td>a. b. c.</td>
</tr>
<tr>
<td>Laboratory and case study reports</td>
<td>20%</td>
<td>a. b. c.</td>
</tr>
</tbody>
</table>

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Experiments and case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. b. c. d. e</td>
<td>a. b. c. d. e</td>
<td>a. b. c. d. e</td>
</tr>
</tbody>
</table>

### 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.
Laboratory Experiments:
- Traction power load flow simulation

Case Study:
- HK MTR systems

Teaching/Learning Methodology:
- Video clips together with computer animations are used to supplement conventional lectures.
- Case studies will be used extensively to highlight the practicality of the subject materials being covered.
- Practitioners are also invited to have experience sharing sessions with the class.
- A group project is to be carried out to demonstrate and integrate the knowledge learned.

Teaching/Learning Methodology Outcomes:
- Pre-requisite: EE3031 & EE4021
- Co-requisite:
- Exclusion

Assessment Methods in line with Intended Learning Outcomes:
- Specific assessment methods/tasks 
  - Lectures: 20% 
  - Tutorials: 20% 
  - Experiments: 60% 

Subject Synopsis:

Intended Learning Outcomes:

1. To enable students to develop a sound understanding of operation of modern electrified railway systems.
2. To provide an appreciation of the design and application of electric drives and operation principles of railway signalling.
3. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control.
4. To introduce to students the vital problems of electromagnetic interference and hardware design of enhanced electromagnetic compatibility.
5. To enhance students' awareness on the use of computer simulation in railway planning and railway system and compare their advantages and limitations with reference to practical railway lines.

Reading List and References:

Textbooks:
4. Selected papers from IEE Proceedings – Electric Power Applications

Reference books/journals:
3. Selected papers from IEE Proceedings – Electric Power Applications
Subject Description Form

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Fibre Optics</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: EE3131 or EIE331

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

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

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

**Subject Synopsis/ Indicative Syllabus**
1. **Overview**: Introduction to the significance of fibre optics for electrical engineering. Summary of applications in high-field environments.
9. **Fibre optic systems design**: Fibre optic communication system design considerations. Attenuation and dispersion budgets. Digital system design.
10. **Applications of fibre optics in electrical engineering**: Optical groundwire. Enhancing power system telecommunications and control with overhead and underground fibre optic cables. Fibre optic sensors for measuring voltage, current, temperature. Location of cable faults by using optical fibre sensing.

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

**Teaching/Learning Methodology**
Lectures, quizzes, laboratory experiments, mini-projects, and examination.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>a b c</td>
</tr>
<tr>
<td>Tutorials</td>
<td>√ √ √</td>
</tr>
<tr>
<td>Experiments/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. Quizzes</td>
<td>2%</td>
<td>a b c</td>
</tr>
<tr>
<td>2. Tests</td>
<td>28%</td>
<td>√ √ √</td>
</tr>
<tr>
<td>3. Laboratory experiment report</td>
<td>5%</td>
<td>√</td>
</tr>
<tr>
<td>4. Mini-projects</td>
<td>5%</td>
<td>√</td>
</tr>
<tr>
<td>5. Examination</td>
<td>60%</td>
<td>√ √ √</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

This subject introduces the physical laws that govern the behaviour of optical fibres, semiconductor light sources and detectors, and how to employ them to design simple fibre-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**

- J. Hecht, Understanding Fiber Optics, 5th edn., Prentice Hall, 2006

Reference books:
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.

<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>Experiment</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 sub ject 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>Total</td>
<td>100%</td>
<td>✓     ✓     ✓     ✓</td>
</tr>
</tbody>
</table>

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

**Student Study Effort Expected**
- Lecture/Tutorial: 36 Hrs.
- Laboratory (mini-project): 12 Hrs.
- 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 Code: EE321

**Intelligent Buildings**

<table>
<thead>
<tr>
<th>Subject Title</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Credit</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Exclusion</td>
<td>EEE321</td>
</tr>
</tbody>
</table>

**Objectives**

1. To enable students to establish a basic knowledge of the concepts of intelligent buildings.
2. To develop an understanding of the benefits and driving forces of intelligent buildings and its subsystems.
3. To enable students to understand that intelligence of a building can be achieved by integration of control and optimization of building structure, services systems, information technology, management and operation, and automation.
4. To enable students to understand the challenge and difficulty of the subject.
5. To enable students to understand the impacts these services systems/technologies on the building and people.

**Teaching/Learning Methodology**

- Lectures: 50 hours
- Tutorials: 25 hours
- Mini-project/Assignments: 20 hours
- Self-study: 55 hours

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

<table>
<thead>
<tr>
<th>Assessment</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. Identify benefits, impacts and driving forces of intelligent buildings, and its subsystems.</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>20%</td>
<td>B. Describe design philosophy at system level, system configuration, system modules, system sub-modules, and the features of system integration.</td>
</tr>
<tr>
<td>3. Mini-project/Assignments</td>
<td>20%</td>
<td>C. Describe the general principle, concepts and system configurations of structure cabling, including the features, characteristics and applications of different categories of cables.</td>
</tr>
<tr>
<td>4. Self-study</td>
<td>10%</td>
<td>D. Describe the general principle, concepts and system configurations of modern intelligent vertical transportation systems: Sky lobby, double-deck lifts, twin lifts, multimode lifts, etc.</td>
</tr>
<tr>
<td>5. Examination</td>
<td>60%</td>
<td>E. Identify benefits, impacts and driving forces of intelligent buildings, and its subsystems.</td>
</tr>
<tr>
<td>6. Class tests</td>
<td>20%</td>
<td>F. Describe design philosophy at system level, system configuration, system modules, system sub-modules, and the features of system integration.</td>
</tr>
<tr>
<td>7. Mini-project/Assignments</td>
<td>20%</td>
<td>G. Describe the general principle, concepts and system configurations of structure cabling, including the features, characteristics and applications of different categories of cables.</td>
</tr>
<tr>
<td>8. Self-study</td>
<td>10%</td>
<td>H. Describe the general principle, concepts and system configurations of modern intelligent vertical transportation systems: Sky lobby, double-deck lifts, twin lifts, multimode lifts, etc.</td>
</tr>
</tbody>
</table>

**Student Study Effort Expected**

- Other student study: 55 hours (including mini-project/assignments)
- Total student study: 105 hours

**Reading List and References**


**Subject Synopsis/Indicative Syllabus**

1. **Intelligent Buildings**: The benefits and driving forces of intelligent buildings and its subsystems. The role of information technology in building systems, including building automation, distributed systems, communication protocols and on-line measurements. The impact of information technology on buildings discussed. The role of information technology in building systems, including building automation, distributed systems, communication protocols and on-line measurements. The impact of information technology on buildings discussed.
2. **Modern intelligent vertical transportation systems**: The features and benefits of intelligent buildings and its subsystems. The role of information technology in building systems, including building automation, distributed systems, communication protocols and on-line measurements. The impact of information technology on buildings discussed.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Power System Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE4301</td>
<td></td>
</tr>
</tbody>
</table>

**Subject Title:** Power System Protection

**Credit Value:** 3

**Level:** 4

**Pre-requisite/Exclusion:** Pre-requisite: EE3041

**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.

**Intended Learning Outcomes:**

a. Upon completion of the subject, students will:
   1. Have acquired a good understanding of power system protection, their philosophy and working principle.
   2. Be able to interpret nameplate data and to select the most appropriate transducers for various protection schemes.
   3. Be able to carry out tests and analyse the performance of transducers and protective relays.
   4. Be able to apply and adapt applications of mathematics, engineering skills in the analysis, comparison, and interpretation of various power system protection schemes.
   5. Be able to present technical results in the form of a technical report.

**Subject Synopsis/Indicative Syllabus:**

1. **Philosophy of protection**
   - General considerations.
   - Components of protection.
   - Structure of protective relay systems.

2. **Transducers**
   - Input sources for protection system.
   - Current and voltage transformers; sources of error; their performance under normal and abnormal conditions.

3. **Non-unit protection**
   - Overcurrent and directional protection, techniques used to analyze their performances.
   - Distance relays, protection characteristics and impedance seen by distance relays.

4. **Unit protection**
   - Principles of unit protection.
   - High impedance and low impedance differential protection and their applications.
   - Bias differential protection.

5. **Digital protection**
   - Principles of digital relaying.
   - Digital relay architecture.
   - Recent development of digital relaying techniques.

**Laboratory Experiment:**
2. Directional Overcurrent Protection.
3. Low Impedance and High Impedance Busbar Protection.

**Case Study:**
1. Explain how source impedance and fault location affect the performance of protective relays.
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>Lectures</th>
<th>Tutorials</th>
<th>Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Class Test/Quiz</td>
<td>20%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>10%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4. Mini-project &amp; report</td>
<td>10%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</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.

<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</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 | 14 Hrs. |
| Self-study                   | 45 Hrs. |

Total student study effort 105 Hrs.

<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Reference books:</th>
</tr>
</thead>
</table>
### Subject Description Form

**Subject Code:** EE4341  
**Subject Title:** Intelligent Systems Applications in Electrical Engineering  
**Credit Value:** 3  
**Level:** Nil  
**Pre-requisite/Co-requisite/Exclusion:** Nil

### Assessment Methods in Relation with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>Weighting</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td></td>
<td>1. To introduce students to the fundamentals of intelligent systems and their applications in Electrical Engineering including electrical power systems, control and utilization.</td>
</tr>
<tr>
<td>Mini-project Report and Presentation</td>
<td>20%</td>
<td></td>
<td>2. To apply genetic algorithm to different Electrical Engineering problems.</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>3. The outcomes on concepts, design and applications are assessed by the usual means of examination and test. Mini-projects and written reports assess those on analytical skills, problem-solving techniques and practical considerations of intelligent technique.</td>
</tr>
</tbody>
</table>

### Objectives

1. To introduce students to the fundamentals of intelligent systems and their applications in Electrical Engineering including electrical power systems, control and utilization.
2. To apply genetic algorithm to different Electrical Engineering problems.
3. Students are expected to solve the electrical engineering problems using intelligent techniques with critical and analytical thinking. Mini-projects are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

### Teaching Learning Methodology

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

### Student Study Effort Expected

**Class contact:**
- Lecture/Tutorial 36 Hrs.
- Mini-project 12 Hrs.
- Laboratory preparation/report 12 Hrs.
- Self-study 45 Hrs.

**Total student study effort** 105 Hrs.

### Reading List and References

Subject Description Form

**Subject Code**
EI501

**Subject Title**
Alternative Energy Technologies

**Credit Value**
3

**Level**
5

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

**Objectives**
1. To enable students to establish a broad concept on alternative energy techniques in engineering.
2. To provide an in-depth knowledge on selected topics of alternative energy systems in engineering.
3. To enable students to understand typical alternative energy technologies, its associated issues of application and related technical considerations.
4. To enable students to understand the potential of alternative energy and characteristics & performance of various types of alternative energy systems.
5. To enable students to understand various techniques and systems for control and monitoring of alternative energy technologies, as well as the related communication protocol and interfacing requirements.

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

a. Describe the operation principle & control strategy of various alternative energy systems and topologies of these systems.

b. Identify benefits & impacts of the applications of these alternative energy systems, such as their effects on environment and utility energy efficiencies.

c. Describe the operation principle, characteristics and performance of various alternative energy devices/systems.

d. Identify different alternative energy technologies for industrial & commercial plants and multi-storey buildings, including giving examples.

e. Carry out literature search and report the findings in a presentation, when given a technical topic.

**Subject Synopsis/Indicative Syllabus**
1. Energy resources and types: Renewable and non-renewable energy resources. World potential and trends. Environmental effects. Alternative energy types and present developments. Role and importance of alternative energy.

**Teaching/Learning Methodology**
Lectures and tutorials are effective teaching methods:
1. To provide an overview or outline of the subject contents.
2. To introduce new concepts and knowledge to the students.
3. To explain difficult ideas and concepts of the subject.
4. To allow students to feedback on aspects related to their learning.

Mini-project works/Assignments are essential ingredients of this subject:
1. To supplement the lecturing materials.
2. To add real experience for the students.
3. To provide deeper understanding of the subject.
4. To enable students to organise principles and challenge ideas.

**Case studies:**
1. To give real example for some of the concepts presented in the lectures.
2. To explain some practical considerations when applying technologies in real projects.
3. To motivate and stimulate students interest.

Seminars from industrial experts may also be arranged, this will give student up-to-date status of the development in alternative energy area, as well as market trends.

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

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Class tests</td>
<td>20%</td>
<td>(a\ b\ c\ d\ e)</td>
</tr>
<tr>
<td>2. Mini-project/Assignments/ Presentations</td>
<td>20%</td>
<td>(\checkmark\ \checkmark\ \checkmark\ \checkmark)</td>
</tr>
<tr>
<td>3. Examination</td>
<td>60%</td>
<td>(\checkmark\ \checkmark\ \checkmark\ \checkmark)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>(\checkmark\ \checkmark\ \checkmark\ \checkmark)</td>
</tr>
</tbody>
</table>

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**

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 understanding the working principle of power system protection.
4. To master the analytical techniques.
5. To apply protective relaying in power systems.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:
a. 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 |
---------------------------------|------------|
1. Examination | 60% | √ | √ | √ | √ |
2. Class Test | 25% | √ | √ | √ | √ |
3. Assignments | 15% | √ |
Total | 100% |

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

Student Study Effort:
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.

Reading List and References:
Reference books:
1. L. Hewitson, M. Brown and R. Balakrishnan, Practical Power System Protection, Newnes, 2005
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit Value</th>
<th>Level</th>
<th>Pre-requisite/ Exclusion</th>
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</thead>
<tbody>
<tr>
<td>E1505</td>
<td>Power System Control &amp; Operation</td>
<td>5</td>
<td>Nil</td>
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</tbody>
</table>

#### Objectives
1. To introduce the concept of modern power system control & operation to students;
2. To integrate theory and practical knowledge of power system control & operation;
3. To understand the working principle of power system control and operation;
4. To apply the theory in power system control & operation; and
5. To understand the industrial practice and tools used in power system control and operations.

#### Intended Learning Outcomes
1. Analyse power system security control & operation;
2. Analyse interconnected power system interchange and economic operation;
3. Analyse power system computer control and applications;
4. Understand the functionalities and be able to use appropriate level of competence of selected specialty software for power system control and operation purpose;
5. Be aware of new technologies development trends and environmental impacts of modern power system control and operation techniques; and
6. Write technical reports and present the findings through individual effort as well as team work.

#### Assessment Methods in Achieving the Learning Outcomes

<table>
<thead>
<tr>
<th>Methods/tasks</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam</td>
<td>60%</td>
</tr>
<tr>
<td>Class test</td>
<td>20%</td>
</tr>
<tr>
<td>Written report</td>
<td>20%</td>
</tr>
</tbody>
</table>

Total 100%

#### Specific assessment methods/tasks
- 1. Power system operational security & dispatch
- 2. Frequency control & AGC
- 3. Interconnected systems & operation
- 4. Unit commitment & economic dispatch
- 5. Software systems

#### 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

#### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial 42 Hrs.
  - Miniproject preparation/report 10 Hrs.
  - Self-study 53 Hrs.

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

- **Other student study effort:**
  - Written reports 10 Hrs.
  - Other 10 Hrs.

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

#### Subject Synopsis/Indicative Syllabus

1. Local system control centre arrangement.
2. Case study of past system blackout in overseas countries.
3. Power system operational security & dispatch.
4. Software systems.
5. Applications of computer technology in power system control and monitoring.
Subject Description Form

Subject Code: EE509
Subject Title: High Voltage Engineering
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

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:
Upon completion of the subject, students will:

a. Be able to describe the insulation breakdown mechanisms so as to identify the failure phenomena of different insulation systems.

b. Be aware of the design features of high voltage equipment so as to understand the application of common high voltage practices in the industry.

Subject Synopsis/Indicative Syllabus:
1. Introduction to electrical insulation: Electric fields; dielectric breakdown; electrical insulating materials; industrial applications of electrical insulating materials.
2. Breakdown of gaseous insulation: Ionization processes; Townsend breakdown mechanism; breakdown in electronegative gases; streamer breakdown mechanism; Paschen’s law; corona discharges; breakdown in non-uniform fields; post-breakdown phenomena and applications; vacuum insulation and breakdown.
3. Breakdown of liquid insulation: Breakdown in pure liquids; breakdown in commercial liquids; purification and breakdown test.
4. Breakdown of solid insulation: Breakdown due to treeing; breakdown due to surface flashover; breakdown due to surface tracking; breakdown in composite insulation.
5. Partial discharges: Classification of partial discharges by origin; partial discharge measurements.
6. High-voltage equipment: Applications of the above sections to the design of bushings, transformers, overhead lines, cables and circuit breakers.
7. Generation of high voltages: Cascade and series resonant methods for alternating voltages; doubler and multistage rectifiers for direct voltages; single-stage and Marx generators for impulse voltages.
8. High-voltage measurements: Measurement of leakage current; hv voltmeters; measurement of impulse voltages (peak voltage and wave-shape); Schering bridge.
9. High-voltage Applications Outside of T&D: Electrostatic hazards (such as dust explosions, oil-tanker explosions, integrated-circuit damage); applications such as in electrostatic precipitator, paint spraying (and powder coating), ore separation; lightning protection of buildings.

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

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. Continuous assessment</td>
<td>30%</td>
<td>√ √</td>
</tr>
<tr>
<td>3. Case study</td>
<td>10%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

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

Student Study Effort Expected:

Class contact:
- Lecture/Tutorial: 42 Hrs.

Other student study effort:
- Case study: 12 Hrs.
- Self-study: 51 Hrs.

Total student study effort: 105 Hrs.

Reading List and References:
1. M.S. Naidu and V. Kamraja, High Voltage Engineering, 2004
4. A. Bradwell, Electrical Insulation, 1983
5. T.N. Bhar and E.J. McMahon, Electrostatic Discharge Control, 1983
6. W. Bartknecht, Dust Explosions, 1989
7. H. Haase, Electrostatic Hazards: Their Evaluation and Control, 1977
8. J.F. Hughes, Electrostatic Power Coating, 1984
<table>
<thead>
<tr>
<th>Teaching Learning Methodology</th>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>Subject Code: Electrical Traction Engineering</td>
</tr>
<tr>
<td>Tutorials</td>
<td>2. Feeding systems in AC traction</td>
</tr>
<tr>
<td>Project Work</td>
<td>3. Signalling system installation</td>
</tr>
<tr>
<td>Teaching-Learning Methodology</td>
<td>Subject Synopsis/Indicative Syllabus</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>2. Traction drives and railway signalling: Requirement of Inverter substations. Principles of powering and regenerative braking; blended braking; regenerative braking and dynamic braking, EMLC. Induction motor control. PVM, PCC, VVVF.</td>
</tr>
<tr>
<td>Reading List and References</td>
<td></td>
</tr>
<tr>
<td>Subject Title</td>
<td>Reading List and References</td>
</tr>
<tr>
<td>5</td>
<td>3. J. Pachl, Railway Operation and Control. VTD Rail Publishing, Mountlake Terrace (USA) 2004</td>
</tr>
<tr>
<td>5</td>
<td>6. Selected papers from IEE Proceedings – Electric Power Applications</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>Methodology</td>
</tr>
<tr>
<td></td>
<td>1. To provide students with a comprehensive understanding of traction systems from a systems viewpoint.</td>
</tr>
<tr>
<td></td>
<td>2. To enable students to understand the implications of design of traction systems and their relationships with the railway systems as a whole.</td>
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<tr>
<td></td>
<td>3. To enable students to appreciate the current state-of-the-art design and applications of electric traction systems in practice.</td>
</tr>
<tr>
<td></td>
<td>4. To enable students to understand the practical aspects of railway electrification.</td>
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<tr>
<td></td>
<td>5. To identify the necessary future technologies to improve the service quality in railway systems.</td>
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<tr>
<td></td>
<td>Effort Expected</td>
</tr>
<tr>
<td></td>
<td>Class contact: Lecture/Tutorial 33 Hrs.</td>
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<tr>
<td></td>
<td>Invited lecture 3 Hrs.</td>
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<td></td>
<td>Laboratory 6 Hrs.</td>
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<tr>
<td></td>
<td>Assignment and self-studies 63 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Total student study effort 105 Hrs.</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Case Study: Load flow analysis in traction power system</td>
</tr>
<tr>
<td></td>
<td>Laboratory Experiment: Elements of design and analysis of traction systems for optimum control and train scheduling. Computer modelling of non-linear systems and vehicle dynamics. Load-flow analysis in traction power system</td>
</tr>
<tr>
<td></td>
<td>Assessment Methods in Alignment with Intended Learning Outcomes</td>
</tr>
<tr>
<td></td>
<td>1. Mini-project 20%</td>
</tr>
<tr>
<td></td>
<td>2. Tests 20%</td>
</tr>
<tr>
<td></td>
<td>3. Examination 60%</td>
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<td></td>
<td>Total 100%</td>
</tr>
<tr>
<td></td>
<td>For the assessment of the subject, students will be assessed through a mini-project (which aims to integrate the various aspects learnt), tests and written examination.</td>
</tr>
<tr>
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<tr>
<td></td>
<td>1. To provide students with a comprehensive understanding of traction systems from a systems viewpoint.</td>
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<tr>
<td></td>
<td>Assessment Methods in Alignment with Intended Learning Outcomes</td>
</tr>
<tr>
<td></td>
<td>1. Mini-project 20%</td>
</tr>
<tr>
<td></td>
<td>2. Tests 20%</td>
</tr>
<tr>
<td></td>
<td>3. Examination 60%</td>
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<td></td>
<td>Total 100%</td>
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<tr>
<td></td>
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Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE512</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Electric Vehicles</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>5</td>
</tr>
</tbody>
</table>

**Pre-requisite/ Co-requisite/ Exclusion**
Exclusion: EE543

**Objectives**
1. To acquire a broad knowledge on modern electric vehicles (EVs).
2. To understand the development of EVs from technological, environmental, and societal perspectives.

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

a. Understand the importance of EVs for environment, energy sustainability and climate change.

b. 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 (EVs):** Historical perspective. EV advantages and impacts. EV market and promotion: infrastructure needs, legislation and regulation, standardization.

2. **Electric vehicle (EV) design options:** EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. EV parameters, driving cycles and performance specifications. Choice of system voltage levels: electrical safety and protection.


4. **Batteries:** Battery parameters. Types and characteristics of EV batteries. Battery testing and maintenance; charging schemes. Battery monitoring techniques. Open-circuit voltage and ampere-hour estimation. Battery load levelling.


---

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

<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>Assignment and oral presentation</td>
<td>√ √ √ √</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weightings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
</tr>
<tr>
<td>2. Test</td>
<td>25%</td>
</tr>
<tr>
<td>3. Term paper</td>
<td>10%</td>
</tr>
<tr>
<td>4. Oral presentation</td>
<td>5%</td>
</tr>
</tbody>
</table>

Total 100%

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

**Student Study Effort Expected**

- **Class contact:**
  - Lecture 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.**

**Reading List and References**

4. Selected papers from relevant journals and conference proceedings, such as EVS
Subject Code: EE514
Subject Title: Real Time Computing
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

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

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:
a. 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 methods of overcoming these obstacles.
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.
2. Real time systems design issues:
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:

Teaching/Learning Methodology:
Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through a series of design projects with real-life constraints and to train pragmatic solutions.

Teaching/Learning Methodology:
- Lectures
- Tutorials
- Experiments

Assessment Methods in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks | % | Weighting | Outcome to be assessed
--- | --- | --- | ---
1. Examination | | | a, b, c, d
2. Case CEQ/Poster Presentation | | | a, b, c, d
3. Laboratory exercise/Report | | | a, b, c, d
Total | | | a, b, c, d

The outcomes are assessed by the usual means of examination and test while those on analytical skills, problem-solving, synthesising and presentation are evaluated by project work and the reports.

Student Study Effort Expected:
- Lectures and Seminars: 36 Hrs.
- Laboratory demo: 6 Hrs.
- Case Study: 15 Hrs.
- Self-study: 48 Hrs.
- Total student study effort: 105 Hrs.

Reading List and References:
7. 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 fibres.
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 acoustic 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.

Teaching/Learning Methodology:

Lectures are the primary means of teaching the basic concepts and theories. The understanding of basic principles 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.

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 and assignments</td>
<td>25%</td>
<td>a     b     c     d</td>
</tr>
<tr>
<td>3. Laboratory Demonstration</td>
<td>5%</td>
<td>a     b     c     d</td>
</tr>
<tr>
<td>4. Group-project &amp; report</td>
<td>10%</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 examinations, test and assignments whilst those on practical considerations of optical components and systems design, as well as team work and technical report writing abilities are evaluated by group projects and the reports.

Student Study Effort Expected:
Class contact:
- Lecture/Tutorial: 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

Group-project Topics:
To choose from a list of 15 topics and write a study report and give a presentation.

current relations
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 systems in high precision CNC tooling machines.

d. Gantry robot motion systems for SMT component insertion machines.

e. Motion systems in high precision CNC tooling machines.

3. To enable the students to have the ability to design motion control systems for industry appropriate one for the task. To comprehend and understand numerous motion control examples for domestic and industrial applications.

b. Understand the in-depth knowledge of motion drive and sensing techniques, and the ability to use them in real engineering applications.

c. Have a broad understanding of motion control platform hardware and a visionary perspective on the future developments of computing/control hardware. The ability to perform design, simulation, and implementation of motion control algorithm, using appropriate tools and software.

d. Communicate effectively on motion control system topics during discussions and presentations.

References:
1. S. Meshkat, Advanced Motion Control, PC IM reference series in Power Conversion and Intelligent Motion, 1988
7. Case studies in intelligent motion systems:
### Subject Description Form

**Subject Code:** EE521  
**Subject Title:** Industrial Power Electronics  
**Credit Value:** 3  
**Level:** 5  
**Pre-requisite/Co-requisite/Exclusion:** Nil

#### Objectives
1. To provide power electronics engineers with in-depth knowledge of the industrial power electronics.
2. To provide the latest development in power supplies, industrial power electronics systems, 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:
- Have acquired a good understanding of power supply concept and design and be able to analyse the industrial needs for static power conversion.
- Understand the international standards on power electronics design.
- Have had a global view on recent development in power electronics and be aware of applications of power electronics in various industries.
- 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, and DC systems and AC-DC power conversion.
2. **Power conversion:** Soft-switching, Power factor correction, Inverter configurations and static converters.
3. **Special environmental power electronics:** Power electronics distribution systems, systems, brushes, drives, and other applications of power electronics in industry.
4. **Industrial power supplies:** Converter topologies, decoupling power sources, and power distribution systems, AC-DC conversion.
5. **Devices and packaging:** Magnetic and photosensitive devices, high-temperature packaging, and transformers, winding, and packaging technology for power electronics devices.
6. **Magnetic and capacitive devices:** High-frequency and low-loss magnetic materials and power capacitors.

#### Teaching/Learning Methodology
<table>
<thead>
<tr>
<th>Methods/tasks</th>
<th>% weight</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Test (2)</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Laboratory performance report</td>
<td>20%</td>
<td>a, b, c, d, e</td>
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</table>

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

<table>
<thead>
<tr>
<th>Specific assessment methods</th>
<th>% weight</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>Test (2)</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Laboratory performance report</td>
<td>20%</td>
<td>a, b, c, d, e</td>
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</tbody>
</table>

**Student Study Effort Expected:**
- **Class contact:** Lecture/Tutorial 30 Hrs.
- **Laboratory:** 12 Hrs.
- **Laboratory preparation/report:** 15 Hrs.
- **Self-study:** 48 Hrs.

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

#### Reading List and References
- F. P. McCluskey, High temperature Electronics, CRC Press, 2002
- K. W. E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

#### Assessment Outcomes

<table>
<thead>
<tr>
<th>Assessment methods/tasks</th>
<th>% weight</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Test (2)</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>Laboratory performance report</td>
<td>20%</td>
<td>a, b, c, d, e</td>
</tr>
</tbody>
</table>

**Total student study effort:** 105 Hrs.
Subject Description Form

Subject Code  EE522

Subject Title  Optical Fibre Systems

Credit Value  3

Level  5

Pre-requisite/ Co-requisite/ Exclusion  Nil

Objectives

1. To introduce students to the theory and application of optical fibre communication and sensing technology.
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.

Intended Learning Outcomes

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

a. Appreciate recent developments in fibre optic communications.

b. Appreciate the importance of fibre optics technology to the development of communications.

c. Calculate the link budgets of a fibre-optic link.

d. Select the most appropriate passive and active fibre-optic components for fibre-optic sensor systems and fibre optic communication links.

e. Appreciate the pros and cons of the various optical multiplexing techniques.

f. Apply the appropriate fibre-optic equipment/instrument to perform temperature and strain measurements.

g. Calculate the bit-error-rate performance of optical fibre communication systems.

h. Calculate the link performance of optical fibre communication systems, and

d. Have had hands-on experience in the use of optical spectrum analyser for the observation of nonlinear effects and laser spectrum measurement.

i. Appreciate the engineering applications of fibre-optics technologies.

j. Appreciate the importance of optical fibre communications from a historical perspective.

k. Appreciate the advantages of fibre-optic sensors to the electrical engineering industry.

l. Interpret the physical meaning and phenomena behind mathematical equations and computed results.

Subject Synopsis/ Indicative Syllabus

1. Overview of optical fibre communications: Historical perspective, basic concepts, lightwave systems and components, channel capacity.


Laboratory Experiments/Demonstrations:

Optical spectrum analyzer for the observation of nonlinear effects and laser spectrum insertion loss measurement of optical fibres

Fibre Bragg grating sensors

Optical fibre amplifiers

Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>a b c d e f g h i j k l</td>
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<tr>
<td>Tutorials</td>
<td>v v v v v v v v v v</td>
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<tr>
<td>Demonstration/Experiments</td>
<td>v v v v v v v v</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>
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</thead>
<tbody>
<tr>
<td>1. Quizzes</td>
<td>2% a b c d e f g h i j k l</td>
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<tr>
<td>2. Tests</td>
<td>28% v v v v v v v v v v</td>
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<tr>
<td>3. Laboratory experiment report</td>
<td>5% v v v v v v v v v v</td>
</tr>
<tr>
<td>4. Mini-projects</td>
<td>5% v v v v v v v v v v</td>
</tr>
<tr>
<td>5. Examination</td>
<td>60% v v v v v v v v v v</td>
</tr>
<tr>
<td>Total</td>
<td>100% v v v v v v v v v v</td>
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</table>

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

Student Study Effort Expected

- Class contact: Lecture/Seminar 42 Hrs.
- Other student study effort:
  - Mini-projects 9 Hrs.
  - Self-study 54 Hrs.

Total student study effort 105 Hrs.

Reading List and References

Reference books:
## Subject Description Form

### Subject Code: EE524
### Subject Title: Open Electricity Market Operation
### Credit Value: 3
### Level: 5
### Pre-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

<table>
<thead>
<tr>
<th>Lecture/Tutorial</th>
<th>Case Studies &amp; Presentation</th>
<th>Examination</th>
<th>In-class Test</th>
<th>Case Study &amp; Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>60%</td>
<td>20%</td>
<td>20%</td>
<td>50%</td>
<td>6 Hours</td>
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</table>

**Student Study Effort Expected**

- Class contact: Lecture/Tutorial: 36 Hrs., Presentation: 6 Hrs.
- Other student study effort: Case study and report: 12 Hrs., Self-study: 51 Hrs.
- Total student study effort: 105 Hrs.

#### Subject Synopsis/Indicative Syllabus

2. **Electricity Energy Market:** The concepts of modelling and economic analysis framework will be presented through lectures and tutorials with reference to real-life market data. Tutorials will be structured on different sessions for better understanding of the theoretical concepts which require detailed problem solving and active participation of students in the presentation of their case studies.

#### Reading List and References

**Textbooks:**

**Reference books:**
<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Assessment Methods in Learning Outcomes</th>
<th>Intended Learning Outcomes</th>
<th>Reading List and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Code: EE525</td>
<td>Subject Title: Energy Policy and Restructuring of Electricity Supply Industry</td>
<td>Credit Value: 5</td>
<td></td>
</tr>
<tr>
<td>Subject Title</td>
<td>Subject Code</td>
<td>Level</td>
<td>Effort Expected</td>
</tr>
<tr>
<td>Subject Synopsis/Indicative Syllabus</td>
<td></td>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Class contact: Lecture/Tutorial 30 Hrs.</td>
</tr>
<tr>
<td>Intended Learning Outcomes</td>
<td></td>
<td></td>
<td>Other student study effort: Miniproject discussion/report 20 Hrs.</td>
</tr>
<tr>
<td>Specific assessment methods/tasks</td>
<td></td>
<td></td>
<td>Total student study effort: 108 Hrs.</td>
</tr>
</tbody>
</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 familiarize students with the tools of environmental management and implementation of sustainable energy measures.
4. To enable students to analyze the market structures and regulatory framework for electricity supply industry.
5. To equip students with the knowledge and skills to identify and evaluate different pricing concepts and pricing contracts in restructured electricity supply industry.

**Assessment Methods in Learning Outcomes**

- Examination: 60%
- Class Test/Quiz: 25%
- Total weight: 100%

**Intended Subject Learning Outcomes to be Assessed**

2. Restructuring of the ESI: Electricity supply industry structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Key issues for China and Hong Kong.
4. Load management: energy and load growth, direct and indirect load control. Integrated Resources Planning: system cost, end-use development and environmental costs.
5. Technical analysis on energy policies and measures: evaluation of energy prices and market structure, transmission planning.

**Reference Books**

2. S. Hunt, and G. Shuttleworth, Competition and Choice in Electricity, Wiley, 1999

**Subject Description Form**

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

- Subject Code: EE525
- Subject Title: Energy Policy and Restructuring of Electricity Supply Industry
- Credit Value: 5
- Level: Nil

**Assessment Methods in Learning Outcomes**

- Examination: 60%
- Class Test/Quiz: 25%
- Total weight: 100%

**Intended Subject Learning Outcomes to be Assessed**

2. Restructuring of the ESI: Electricity supply industry structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Key issues for China and Hong Kong.
4. Load management: energy and load growth, direct and indirect load control. Integrated Resources Planning: system cost, end-use development and environmental costs.
5. Technical analysis on energy policies and measures: evaluation of energy prices and market structure, transmission planning.

**Reference Books**

2. S. Hunt, and G. Shuttleworth, Competition and Choice in Electricity, Wiley, 1999
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 an in-depth understanding of different types of power system stability problems.

b. Be able to model the dynamic behaviors 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 (SVS); Thyristor Switched Capacitor (TSC); Thyristor controlled Reactor (TCR).

Laboratory Experiment:

Teaching/Learning Methodology Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>√</td>
</tr>
<tr>
<td>Class Test</td>
<td>20%</td>
<td>√</td>
</tr>
<tr>
<td>Laboratory</td>
<td>20%</td>
<td>√</td>
</tr>
<tr>
<td>Performance &amp; Report</td>
<td>100%</td>
<td>√</td>
</tr>
</tbody>
</table>

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 by practical exercises and laboratory experiments, which are designed to provide hands-on experience in solving stability and control design problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments are designed to take extra readings and to look for relevant information.

Assessment Method in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Contact</td>
<td>√</td>
</tr>
<tr>
<td>Laboratory</td>
<td>√</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td>√</td>
</tr>
<tr>
<td>Laboratory preparation report</td>
<td>√</td>
</tr>
<tr>
<td>Total student study effort</td>
<td>105 Hrs.</td>
</tr>
</tbody>
</table>

Reading List and References:

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.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE527</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Auto-tuning for Industrial Processes</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 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**


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.

**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.

**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 (\checkmark) b c d e</td>
</tr>
<tr>
<td>2. Case studies</td>
<td>40%</td>
<td>a (\checkmark) b (\checkmark) c d e</td>
</tr>
</tbody>
</table>

**Reading List and References**

3. Selected papers from IEEE Transactions and IEE proceeding and other relevant journals
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE528</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>System Modelling and Optimal Control</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>5</td>
</tr>
</tbody>
</table>

Pre-requisite/ Co-requisite/ Exclusion
Nil

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

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

a. Model systems using State Variable and Bond Graph Models.

b. Design optimal controllers for system models.

c. Apply computer packages for control system modelling and design.

d. Report and present the technical findings in logical and organised manner.

e. Practice their knowledge in team work.

Subject Synopsis/ Indicative Syllabus
2. Optimisations: Multivariables optimisations; Optimisations with constraints.

Laboratory Experiments:
Matlab Fundamentals
Transformation of System Models with Matlab
Simulations of optimal control systems

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td>Tutorials</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td>Experiments</td>
<td>( \checkmark )</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>( \checkmark ) ( \checkmark ) ( \checkmark )</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>( \checkmark ) ( \checkmark )</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>10%</td>
<td>( \checkmark ) ( \checkmark )</td>
</tr>
<tr>
<td>4. Assignments &amp; class works</td>
<td>10%</td>
<td>( \checkmark ) ( \checkmark )</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>( \checkmark ) ( \checkmark ) ( \checkmark )</td>
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</table>

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

Student Study Effort Expected

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

Total student study effort: 105 Hrs.

Reading List and References
Subject Description Form

Subject Code: EE529

Subject Title: Power Electronics for Utility Applications

Credit Value: 3

Level: 5

Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To enable students to understand the problems faced by modern power utilities and how power electronics can overcome these problems.
2. To introduce to students to the various topologies of the power electronics circuits.
3. To provide basic understanding of the emerging power electronics technologies for power utility applications.
4. To enable students to understand the harmonics issues in power utility and means of controlling it using power electronics.
5. To enable students to design power electronics circuit that can control active and reactive power flow.

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

a. Explain why power electronics are needed in modern power system and understand of various emerging power electronics technologies for power utility applications.
b. Explain the main topologies of power electronic circuits used in utility applications and how these differ from low power applications.
c. Determine the harmonic filter required to satisfy the harmonic standard for a given harmonic load in a power system.
d. Identify power electronics topologies for used in controlling active and reactive power in a power system.
e. Communicate and work effectively on why and how power electronics can be used for power utility applications in terms of written reports and oral presentations.

Subject Synopsis/Indicative Syllabus:
1. Power electronics revolution in utility applications: Power Electronics and utility needs, control of power flow in the utility grid, power transport and voltage support, distributed generation, improvement of electrical energy efficiencies, power quality, an overview of power electronics 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 Compansation (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.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>a b c d e</td>
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<tr>
<td>Tutorials</td>
<td>a b c d e</td>
</tr>
<tr>
<td>Mini-project</td>
<td>a b c d e</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</td>
<td>20%</td>
<td>a b c d e</td>
</tr>
<tr>
<td>3. Mini-project &amp; Report</td>
<td>20%</td>
<td>a b c d e</td>
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</tbody>
</table>

Total 100%

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

Student Study Effort Expected:

- Class contact: 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:

Reference books:
Subject Description Form

Subject Code: EE530

Subject Title: Electrical Energy-saving Systems

Credit Value: 3

Level: 5

Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To enable students to establish a broad concept on energy saving using techniques of electrical engineering.
2. To provide an in-depth knowledge on selected topics of energy-saving systems in electrical engineering.
3. To enable students to understand typical energy storage systems, its associated issues of grid connection and related technical considerations.
4. To enable students to understand the potential of solar energy and characteristics & performance of various kinds solar energy systems.
5. To enable students to understand various techniques and systems for control and monitoring of energy saving, as well as the related communication protocols and interfacing requirements.
6. To enable students to understand control gears for lighting systems and variable speed drives for HVAC systems & elevators.

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

a. Describe the operation principle & control strategy of various energy storage systems and topologies of these systems and identify their benefits & impacts.

b. Describe the principle and characteristics of various solar energy devices, and identify the potentials of solar energy. Calculate available solar irradiation for a given location.

c. Describe the operation principle and characteristics of typical control and monitoring systems for energy saving, including the communication protocols and interfacing requirements.

d. Identify different energy saving control for industrial plants and multi-story buildings, including giving examples.

e. Describe the operation principle and characteristics of typical control gear for lighting and Variables speed drives.

f. Given a technical topic, carry out literature search and report the findings in a presentation and be able to work and communicate effectively in a team setting.

Subject Synopsis/Indicative Syllabus:
1. Energy storage systems: Utility Load Factor, peak lopping and valley filling, energy storage systems, battery energy storage, power electronics topologies, control strategy, grid connection, voltage support, power quality improvement, improvement of utility energy efficiencies.

2. Solar energy utilization: Solar irradiation on earth, potentials of solar energy, solar thermal system systems, photovoltaic systems, characteristics and performance of different solar devices and systems of different configurations, case study.


4. Lighting, ballast, and variable speed drives: Magnetic ballast, electronic ballast, lighting design, fluorescent, LED and HID lamps, variable speed drives for HVAC systems and elevators, harmonics implications.

Laboatory Experiments, Seminars, Site Visits: Demonstration on operating principles of some selected energy-saving systems.

Case study: Selections of practical real life energy-saving systems in Hong Kong.

Teaching/Learning Methodology

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Practical experiences on power electronics design, energy saving and applications are given through mini-projects. Mini-projects are given in the beginning of the study. Students are encouraged to form groups to jointly investigate an industrial problem and they have to present the projects in front of the class.

Teaching/Learning Methodology: Outcomes

<table>
<thead>
<tr>
<th>Methods/tasks</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✓</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>
<td>✓</td>
</tr>
<tr>
<td>Mini-project</td>
<td>✓</td>
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Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>1. Examination</td>
<td>60%</td>
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<tr>
<td>2. Class Test</td>
<td>20%</td>
</tr>
<tr>
<td>3. Mini-project &amp; Report</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</table>

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

Student Study Effort Expected

- Lecture/Tutorial: 30 Hrs.
- Seminar/Case study: 12 Hrs.

Other student study effort:

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

Total student study effort: 105 Hrs.

Reading List and References

Reference Books:
17. P. D. Arnold, Electrical and Electronic Measurements, Kharagpur: Indian Institute of Technology, 2005
Subject Description Form

Subject Code: ELC2501
Subject Title: University English I
Credit Value: 2
Level: 2
Pre-requisite / Co-requisite / Exclusion: Nil

Objectives:
This subject aims to help students to study effectively in the University’s English medium learning environment and, more specifically, to improve and develop their English language proficiency within a framework of academic contexts. In striving to achieve the two interrelated objectives, attention will be given to developing the core competencies the University has identified as vital to the development of effective life-long learning strategies and skills.

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

1. Writing well-organised academic texts, such as expository essays
2. Using appropriate referencing skills in academic writing and speaking
3. Delivering effective oral presentations

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.

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

1. Written academic communication
   - Identifying and employing functions common in written academic discourse:
     a. note-taking from reading and listening inputs
     b. understanding and applying principles of academic text structure
     c. developing paraphrasing, summarising and referencing skills
     d. improving editing and proofreading skills
     e. achieving appropriate tone and style in academic writing
2. Spoken academic communication
   - Recognising the purposes of, and differences between, spoken and written communication in English:
   - Identifying and practising the verbal and non-verbal interaction strategies in oral presentations:
   - Explaining and presenting ideas that require the development and application of logical thinking
3. Reading and listening in academic contexts
   - Understanding the content and structure of information delivered orally and in print:
   - Reading and listening for different purposes e.g. as input to tasks, and for understanding peripheral and contextual information

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

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating essays, mini-presentations and discussions. Students will be referred to information on the internet and learning materials developed by the English Language Centre are used throughout this course.

Assessment Method in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks (Continuous assessment):

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

Total 100%

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Students’ oral and written 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.

Student Study Effort Required:

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 I. Hong Kong: The Hong Kong Polytechnic University.

Recommended readings

Cambridge: Cambridge University Press.


### Subject Description Form

**Subject Code**: ELC2502  
**Subject Title**: University English II  
**Credit Value**: 2  
**Level**: 2

**Pre-requisite / Co-requisite / Exclusion**:  
- **ELC2501 University English I**  
- **Nil**  
- **Nil**

**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 appropriately to the context and critically select relevant information to develop a thesis and arguments in a text.

**Subject Synopsis/ Indicative Syllabus**: 
- **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 an academic environment.

- **The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations and discussions. Students will be referred to information on the internet and the ELC's Centre for Independent Language Learning.
- **Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.**

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

<table>
<thead>
<tr>
<th>Class:</th>
<th>Continuous discussion</th>
<th>Discursive essay</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>40%</td>
<td>60%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

**Recommended Readings**


**Student Study Effort Required**

- **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**:
## Subject Description Form

### Subject Code
ELC3504

### Subject Title
English for Effective Workplace Communication

### Credit Value
2

### Level
3

### Prerequisite / 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:
1. 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 assessed on the accuracy and the appropriacy of the language used, and the selection and organisation of ideas.

### Subject Synopsis / Indicative Syllabus
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, organizing ideas and information, describing technical terms and concepts, adopting an appropriate style, format, structure and layout.
3. **Workplace reports**
   - Selecting and using relevant content, organizing ideas and information, describing technical terms and concepts, adopting an appropriate style, format, structure and layout.
4. **Language appropriacy**
   - Using context-sensitive language in spoken and written English.

### 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 profession.

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations. Additional reference materials are used throughout this course. Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

### Assessment Methodology

<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>1. Job interview</td>
<td>a</td>
<td>√</td>
</tr>
<tr>
<td>2. Email and report</td>
<td>b</td>
<td>√</td>
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<tr>
<td>3. Writing</td>
<td>c</td>
<td>√</td>
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<tr>
<td>Total</td>
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### Student Study Effort Required

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>Other student study effort:</th>
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</thead>
<tbody>
<tr>
<td>Seminars</td>
<td>Classwork-related and project-related preparation and self-access work.</td>
</tr>
</tbody>
</table>

Total student study effort 84 Hrs.

### Reading List and References

- **Coursebook**
  - English Language Centre. (2009). ELC 3504 English for Effective Workplace Communication. The Hong Kong Polytechnic University.

- **Recommended readings**
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Publisher</th>
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</thead>
<tbody>
<tr>
<td>Potter, J.</td>
<td><em>Common business English errors in Hong Kong</em></td>
<td>Hong Kong: Longman.</td>
</tr>
</tbody>
</table>
## 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

**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 provides 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**
   - Application of information technology in different fields.
   - Engineering design.
   - Information processing and communication systems.
   - Networking concepts.
   - Computer hardware components.
   - Network component components: CPU, RAM, ROM, I/O devices and internal buses.
   - Software components: applications, utilities and operating systems.
   - Case study: Linux – user Interfaces, file management and process management.
   - (10 hours)

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

3. **Introduction to data processing and information systems**
   - Database concepts and design.
   - SQL database management system: Web and database linking.
   - Programming languages: Java, Python.
   - Case study: Introduction to Information Systems. Workflow management.
   - (14 hours)

### Teaching/Learning Methodology

There will be a mix of lectures, tutorials and laboratory works to facilitate effective learning.

### Assessment Methods

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Continuous Assessment</td>
<td>40%</td>
</tr>
<tr>
<td>Examination</td>
<td>60%</td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Student Study Effort Expected

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

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

- **Total student study effort**: 126 Hrs.

### Reading List and References


### Specific assessment methods

<table>
<thead>
<tr>
<th>Specific Assessment Method</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>40%</td>
</tr>
<tr>
<td>Examination</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
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</tr>
</tbody>
</table>

### Specific assessment criteria

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>A1, A2, A3, A4, B1</td>
</tr>
<tr>
<td>Examination</td>
<td>A1, A2, A3, A4, B1</td>
</tr>
<tr>
<td>Other student study</td>
<td>A2, A3, B5</td>
</tr>
</tbody>
</table>

The assessment methods include an end-of-subject examination (60%), three tests (15%), and two laboratory works (15%). The examination covers the intended subject learning outcomes A1, A2, A3, A4 and B1.

The continuous assessment (three tests, each 15%) cover intended subject learning outcomes A2, A3 and B1.

The laboratory works (with 1 test) cover intended subject learning outcomes A2, A3 and B1.

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).
### Subject Description Form

#### Subject Code
ENM232

#### Subject Title
Engineering Science

#### Credit Value
3

#### Level
2

#### Pre-requisite/Exclusion
Nil

#### Assessment Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Weighting</th>
<th>Intended Subject Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>60%</td>
<td>1. Apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials.</td>
</tr>
<tr>
<td>Tutorials</td>
<td>20%</td>
<td>2. Familiarize and apply thermodynamic properties of common substances, such as air and water, for common energy transformation devices and systems.</td>
</tr>
<tr>
<td>Laboratory works</td>
<td>20%</td>
<td>3. Upon completion of the subject, students will be able to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) Tensile strength of metallic and plastic materials with an emphasis on using this knowledge to solve engineering problems related to stress, strain and fracture of materials.</td>
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<td></td>
<td></td>
<td>b) To provide a basic understanding on relationship between material properties and manufacturing processes so that (students) are able to select those that are appropriate taking into consideration green design and environmental issues.</td>
</tr>
</tbody>
</table>

#### Intended Learning Outcomes

1. To enable students to establish a broad knowledge base on the atomic structure, and properties of materials.
2. To make students familiar with the different materials and their properties and their applications.
3. To enable students to understand the forms of energy and their conversion.

#### Reading List and References

4. Energy Trends, Conversion and Engineering: World consumption of primary energy sources. Technologies and issues in the conversion of different sources of energy.
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG236</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Computer Programming</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
</tbody>
</table>

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

**Objectives**

(i) To introduce the fundamental concepts of computer programming  
(ii) To equip students with sound skills in C/C++ programming language  
(iii) To equip students with techniques for developing structured and object-oriented computer programs  
(iv) To demonstrate the techniques for implementing engineering applications using computer programs.

**Intended Learning Outcomes**

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

- **Category A: Professional/academic knowledge and skills**
  1. Familiarize themselves with at least one C/C++ programming environment.
  2. Be proficient in using the basic constructs of C/C++ to develop a computer program.
  3. Be able to develop a structured and documented computer program.
  4. Understand the fundamentals of object-oriented programming and be able to apply it in computer program development.
  5. Be able to apply the computer programming techniques to solve practical engineering problems.

- **Category B: Attributes for all-roundedness**
  6. Be able to solve problems by using systematic approaches in a team.

**Subject Synopsis/Indicative Syllabus**

Syllabus:

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

**Teaching/Learning Methodology**

<table>
<thead>
<tr>
<th>Teaching and Learning Method</th>
<th>Intended Subject Learning Outcome</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures, supplemented with short quizzes</td>
<td>2,3,4</td>
<td>Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using C/C++ and apply the techniques of developing structured object-oriented applications.</td>
</tr>
<tr>
<td>Laboratories/tutorials where problems are given to students for them to solve</td>
<td>1,2,3,4,5</td>
<td>Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finishing the exercises, and interactive Q&amp;A will take place.</td>
</tr>
<tr>
<td>Homework, and tests</td>
<td>1,2,3,4,5</td>
<td>Through working homework, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given C/C++ applications and apply knowledge in solving problems. For some design type of problems, they will have to synthesize solutions by evaluating different alternatives. To assure students' understanding of fundamental concepts, closed-book tests are arranged regularly. To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly.</td>
</tr>
<tr>
<td>Mini-project</td>
<td>1,2,3,4,5,6</td>
<td>After all the subject materials have been delivered, students are asked to finish a mini-project in a team. The project involves a practical engineering problem of some stated specification.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Specific assessment method/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In-class exercises</td>
<td>10</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

1.23456
2. Short-quizzes 10
3. Closed-book tests 20
4. Programming tests 30
5. Mini-project 30
Total 100 %

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The short-quizzes are for assessing the understanding of fundamental concepts. The in-class exercises, closed-book tests and programming tests are conducted to help students familiarized with the programming language and skills. The problems to be solved by the students are typically presented as practical engineering problems. Through conducting a mini-project that lasts for several weeks, students would be able to experience how to solve problems by using a systematic approach in a team.

Student Study Effort Expected (Within TWO semesters)

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>64 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lecture</td>
<td>30 Hours</td>
</tr>
<tr>
<td>• Tutorial</td>
<td>19 Hours</td>
</tr>
<tr>
<td>• Test/Quiz</td>
<td>14 Hours</td>
</tr>
<tr>
<td>• Mini-project presentation</td>
<td>1 Hours</td>
</tr>
</tbody>
</table>

Other student study effort:

| • Self-studying | 40 Hours |
| • Homework      | 13 Hours |
| • Mini-project/Report | 8 Hours |

Total student study effort 125 Hours

Reading List and References

Reference Books:
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Basic Electricity and Electronics I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Pre-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

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

#### Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Subject Synopsis/Indicative Syllabus</th>
<th>Student Study Effort Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Assessment Methods in Relation to Teaching/Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/kind</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams</td>
<td>60</td>
<td>a, b</td>
</tr>
<tr>
<td>Class Tests</td>
<td>16</td>
<td>b, c</td>
</tr>
<tr>
<td>Assignments</td>
<td>12</td>
<td>a, c</td>
</tr>
<tr>
<td>Tutorials</td>
<td>12</td>
<td>a, b, c</td>
</tr>
<tr>
<td>Lab Logbooks &amp; Report</td>
<td>12</td>
<td>a, b, c</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>a, b, c</td>
</tr>
</tbody>
</table>

#### Reading List and References


#### Effort Required

- **Lectures:** 25 Hrs.
- **Laboratory experiment:** 9 Hrs.
- **Supplementary tutorials/consultations:** 25 Hrs.
- **Self-study:** 42 Hrs.
- **Total student study effort:** 102 Hrs.
### Subject Description Form

**Subject Code:** ENG238  
**Subject Title:** Basic Electricity and Electronics II  
**Subject Synopsis/Indicative Syllabus**

1. **Diode Fundamentals**  
   - 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 amplifiers. DC biasing and analysis of a simple bi-polar transistor amplifier. (8 hours)
3. **Transistor Amplifiers and Small-signal Concepts**  
   - 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 s. Introduction to frequency domain. Frequency domain analysis of linear systems: transfer function, frequency response, Bode plots, root-loci, Nyquist criterion, and pole-zero maps. Complex Fourier series and Fourier transform analysis. Two-coordinate system (polar and phasor). Frequency domain analysis of ac circuits. (9 hours)
6. **Fundamentals of Electrical Machines**  
   - Electromagnetics. Transformer analysis using magnetic circuit models. DC motors and generators. (9 hours)

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific Assessment Methods</th>
<th>Methods in Intended Learning Outcomes to be Assessed</th>
<th>Specified % Weighting</th>
<th>Subject Study Effort Expected</th>
<th>Other Student Study Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>a) describe the fundamental aspects of diodes, bipolar junction transistor (BJT) and amplifiers, metal-oxide-semiconductor field-effect transistor (MOSFET) and amplifiers, operational amplifiers, basic op-amp circuits and their applications. (60% of marks)</td>
<td>a</td>
<td>42 Hrs.</td>
<td>42 Hrs.</td>
</tr>
<tr>
<td>Test</td>
<td>b) describe the fundamental aspects of electrical machines. (12% of marks)</td>
<td>b</td>
<td>24 Hrs.</td>
<td>33 Hrs.</td>
</tr>
<tr>
<td>Laboratory</td>
<td>c) list the intended subject learning outcomes to be assessed (Please tick appropriate columns). (12% of marks)</td>
<td>c</td>
<td>16 Hrs.</td>
<td>16 Hrs.</td>
</tr>
<tr>
<td>Total</td>
<td>d) self-study effort: Report writing for laboratory work. (8% of marks)</td>
<td>d</td>
<td>6 Hrs.</td>
<td>50 Hrs.</td>
</tr>
</tbody>
</table>

**Total Student Study Effort:** 105 Hours

### Student Study Effort Expected

- **Class contact:** Lecture (42 hrs) and laboratory (11 hrs) 24 Hrs.
- **Self study:** 33 Hrs.
- **Report writing for laboratory work:** 6 Hrs.

### References

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENM307</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>
<tr>
<td>Pre-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**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 public.
- This semester offers an understanding of the historical context of modern technology and the nature of the process whereby technology develops and its relationship to society.
- The subject intends to enable students to apply and synthesize acquired knowledge on the basis of their performance in group discussion, oral presentations, and the quality of their portfolio reports on these case studies.

**Assessment Method 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. Continuous learning activities</td>
<td>60%</td>
<td>a. Group work and learning activities (60%)</td>
</tr>
<tr>
<td>2. Final presentation</td>
<td></td>
<td>b. Final presentation (10%)</td>
</tr>
<tr>
<td>3. Group report and individual reflection report</td>
<td>40%</td>
<td>c. Group report and individual reflection report (10%)</td>
</tr>
</tbody>
</table>

**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.

**Subject Synopsis/Indicative Syllabus**

1. Impact of technology on society: Innovation and creativity; the history and the trends of technology on the social and culture on society.
2. Industrial health and safety: Industrial health and safety including the work of the Labour Department and the Occupational Safety and Health Society of Hong Kong.
3. Professional ethics: Professional ethics, bribery and corruption including the work of the ICAC.

**Teaching/Learning Methodology**

- In-class, there will be short lectures to provide essential knowledge and information on the relationship between society and the engineer under a range of dimensions.
- There will be discussions on case studies, seminars to engage students in-depth analysis of the relationship between society and the engineer under a range of dimensions.
- There will be case analyses: students will base the case analysis, and provide weekly summary report on the relationship between society and the engineer under a range of dimensions.

**Teaching/Learning Methodology**

- Reading material:
  - 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
    - South China Morning Post
    - China Daily
    - Ming Pao Daily

**Teaching/Learning Methodology**

- Current newspaper:
  - China Markets.

**Teaching/Learning Methodology**

- Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
  - Continuous Assessment: 60%
  - Examination: 40%
  - Total: 100%

**Teaching/Learning Methodology**

- **Intended Learning Outcomes**
  - Upon completion of the subject, students will be able to:
    - Identify and evaluate the impacts on the use of technology relating to social, cultural, economic, legal, health and safety, environment and welfare of society.
    - Explain the importance of professional training of institutions, professional conduct, ethics and responsibilities in various engineering activities (local and overseas). Particularly the Washington Accord.
    - Observe the professional conduct, the legal and more constraints relating to various engineering aspects.
    - Observe the professional conduct, the legal and more constraints relating to various engineering aspects.
  - Learning Outcomes:
    - (a) Identify and evaluate the impacts on the use of technology relating to social, cultural, economic, legal, health and safety, environment and welfare of society.
    - (b) Explain the importance of professional training of institutions, professional conduct, ethics and responsibilities in various engineering activities (local and overseas). Particularly the Washington Accord.
    - (c) Observe the professional conduct, the legal and more constraints relating to various engineering aspects.

**Teaching/Learning Methodology**

- **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.
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IC2105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Engineering Communication and Fundamentals</td>
</tr>
<tr>
<td>Credit Value</td>
<td>4 Training Credits</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Objectives**

This subject offers a wide spectrum of coverage on various engineering fundamental matters, including Engineering Drawing and CAD, Basic Scientific Computing, Basic Mechatronic Practice, and Industrial Safety, that aims at providing the necessary fundamental knowledge and computing skills to all year 1 students interested in engineering.

**Intended Learning Outcomes**

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

- a) explain the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems, electrical, electronic and information engineering;
- b) apply scientific computing software for computing in science and engineering including visualization and programming;
- c) design and analyze practical controller hardware, software, actuation devices and human-machine interface for simple mechatronic systems including basic practice in hydraulic, pneumatic and electric systems with common engineering components such as motor drives, mechanical drives, gears, cams, belts, pulleys, couplings, bearings, seals and fasteners; and
- d) explain basic occupational health and industrial safety requirements for engineering practice.

---

**Subject Synopsis/Indicative Syllabus**

**Syllabus:**

1. *(TM8050) Engineering Drawing and CAD*

   1.1. Fundamentals of Engineering Drawing and CAD
   Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances and surface finishes; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing.

      Introduction to CAD; 2D drawings and general concepts on 3D computer modeling including extruding, revolving, sweeping, and lofting; parametric feature based solid modeling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list.

   1.2. Electrical Drawing
   Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical and electronic device symbols and layout, architectural wiring diagram with reference to the architectural symbols for electrical drawings in Hong Kong and international standards.

   1.3. Electronic Design Automation
   Introduction to electronic design automation software; circuit schematics capture and representation; placement of components, capturing, annotation, labeling, net list. Electronic parts library, symbols, decals, physical packages, discrete components, integrated circuits, logic and analogue circuits, electronic parts creation and application.

2. *(TM3012) Basic Scientific Computing*

   2.1. Introduction to MATLAB; interactive calculations, random number generators, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting, file I/O functions.

   2.2. Basic plotting, formatting graph, 2D and 3D plots, annotations, contour, mesh and surface plots, colormap.

   2.3. M-file programming and debugging; scripts, functions, logic operations, flow control and graphic user interfaces.
3. (TM0510) Basic Mechatronic Practice
   3.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces.
   3.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design.

4. (TM2009) Industrial Safety
   4.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling.
   4.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment.

Learning Methodology
The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students’ in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Weighting (%)</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a  b  c  d</td>
<td></td>
</tr>
<tr>
<td>Continuous Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Assignment / Project</td>
<td>✓  ✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>2. Test</td>
<td>✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>3. Report / Logbook</td>
<td>✓  ✓</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment / Project</td>
<td>The project is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.</td>
</tr>
<tr>
<td>2. Test</td>
<td>Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.</td>
</tr>
<tr>
<td>3. Report / Logbook</td>
<td>Report / Logbook is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.</td>
</tr>
</tbody>
</table>

Student Study Effort Required

<table>
<thead>
<tr>
<th>Class Contact</th>
<th>TM8050</th>
<th>TM3012</th>
<th>TM0510</th>
<th>TM2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>18 Hrs.</td>
<td>9 Hrs.</td>
<td>6 Hrs.</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td>Tutorial</td>
<td>13 Hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-class Assignment/ Hands-on Practice</td>
<td>17 Hrs.</td>
<td>18 Hrs.</td>
<td>24 Hrs.</td>
<td>1 Hr.</td>
</tr>
</tbody>
</table>

Other Study Effort

- Coursework 8 Hrs.

Total Study Effort 128 Hrs.
### Reading List and References

<table>
<thead>
<tr>
<th>Reference Software List:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AutoCAD from Autodesk Inc.</td>
</tr>
<tr>
<td>2. SolidWorks from Dassault Systèmes Solidworks Corp.</td>
</tr>
<tr>
<td>3. MATLAB from The Mathworks Inc.</td>
</tr>
<tr>
<td>4. PADS from Mentor Graphics Inc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference Standards and Handbooks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. IEC 61082 Preparation of Documents used in Electrotechnology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference Books:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training material, manual and articles published by Industrial Centre.</td>
</tr>
<tr>
<td>Subject Description Form</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Subject Code</strong></td>
</tr>
<tr>
<td><strong>Subject Title</strong></td>
</tr>
<tr>
<td><strong>Credit Value</strong></td>
</tr>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td><strong>Pre-requisite/ Co-requisite/ Exclusion</strong></td>
</tr>
</tbody>
</table>
| **Objectives**          | 1) To provide trainees with simulated working environments and training of industrial practices in Electrical Engineering.  
2) This subject covers a wide range of fundamental electrical engineering application technology that including electrical installation practice, lighting and electrical system design, LV switchboard and power monitoring, integral building system and basic electronic practice. |

**Intended Learning Outcomes**

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

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

<table>
<thead>
<tr>
<th>Subject Synopsis/ Indicative Syllabus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(TM0367) Lighting and Electrical System Design</strong></td>
</tr>
</tbody>
</table>
Interior lighting design and calculation; daylight illumination consideration; lumens and reflectors; T5, T8 and T11 lamps; energy conservation.

Introduction of low-voltage power distribution system and code of practices of electrical design in Hong Kong; examine architectural drawings; design lighting and electrical services; prepare layout drawings and schematics.

**(TM0389) Low-voltage Switchboard and Power Monitoring, AC Control and PLC**

Specifications, standards and requirements of LV switchboard; IDMTL and electronic protection relays; schematic diagram, testing, commissioning and maintenance.

Power monitoring and analysis, noise and harmonics; active filters and real-time capacitor bank.

Introduction of programmable controller systems, sensors, actuators, drives, timers, counters, ladder logic programming and testing.

**(TM0383) Integrated Building Systems**

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

**(TM0373) Electrical Installation and Basic Electronic Practice**

Wiring for conventional low voltage installations and intelligent building control systems (EIB and DALI); final lighting and power circuits, control gears and protective devices; inspection, testing.

Identification of electronic circuit components, soldering and de-soldering, Dry film process, Etching process.

<table>
<thead>
<tr>
<th>Learning Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>
### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Weighting (%)</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>a</td>
</tr>
</tbody>
</table>

#### TM0367 Lighting and Electrical System Design

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment</td>
<td>40</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Test</td>
<td>30</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TM0389 Low-Voltage Switchboard and Power Monitoring, AC Control and PLC

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment</td>
<td>40</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Test</td>
<td>30</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
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</tbody>
</table>

#### TM0383 Integrated Building Systems

<p>| | | | | | | |</p>
<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment</td>
<td>40</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2. Test</td>
<td>30</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The assignment is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.

Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.

Training Report is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

### Student Study Effort Required

- **Class Contact**
  - Lecture / Tutorial / Demonstration: 30 Hrs.
  - Workshop Practice: 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.
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ISE404</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Total Quality Management</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**
Students who do not have background knowledge in quality control and quality engineering should be prepared to do additional reading.

**Objectives**
This subject provides students with the knowledge to
1. understand the philosophy and core values of Total Quality Management (TQM);
2. determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization;
3. apply and evaluate best practices for the attainment of total quality.

**Intended Learning Outcomes**
Upon completion of the subject, students will be able to
a. select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies;
b. measure the cost of poor quality and process effectiveness and efficiency to track performance quality and to identify areas for improvement;
c. understand proven methodologies to enhance management processes, such as benchmarking and business process reengineering;
d. choose a framework to evaluate the performance excellence of an organization, and determine the set of performance indicators that will align people with the objectives of the organization.

**Subject Synopsis/Indicative Syllabus**
1. **Principles of Total Quality**
   Concepts of quality; Core values and paradigms for TQM, including corporate citizenship and protection of the environment; Models for performance excellence: Deming Prize, Baldrige Quality Award, European Quality Award
2. **Customer Needs**
   Internal and external customers; Voice of the customer; Customer satisfaction; Customer loyalty; Service recovery; Crisis management
3. **Economies of Quality**

---

**Teaching/Learning Methodology**
A mixture of lectures, group discussions (tutorials), and mini-case studies are used to achieve the objectives of this subject. Some topics are taught in the classroom environment; students have to learn these topics by themselves in the process of writing problem-based assignments. Directed study is also used to develop the self-learning ability of students.

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

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>35%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Examination</td>
<td>45%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

The assignments, reflective journals, essays, and case studies facilitate the application of concepts and skills learned in analyzing and attaining total quality while emphasizing factors that may affect decisions.

Examination/tests allow students to demonstrate the extent of their understanding of concepts, as well as their abilities to analyze and solve problems related to the subject.

**Student Study Effort Expected**

- Lecture/Tutorial 2 hours/week for 14 weeks 28 Hrs.
- Tutorial/Case Study 1 hour/week for 14 weeks 14 Hrs.
Other student study effort:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studying and self learning</td>
<td>50 Hrs.</td>
</tr>
<tr>
<td>Assignment and report writing</td>
<td>28 Hrs.</td>
</tr>
<tr>
<td><strong>Total student study effort</strong></td>
<td><strong>120 Hrs.</strong></td>
</tr>
</tbody>
</table>

Reading List and References

4. Selected articles in Quality Progress and the web site of American Society for Quality
## 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 the impact of the external environments, both domestic and global, on managers' jobs. The subject also provides students with knowledge and skills in leadership, teamwork, and decision making. In addition, it prepares students on how to analyse and resolve ethical issues in various business settings.

## Subject Learning Outcomes

<table>
<thead>
<tr>
<th>a.</th>
<th>b.</th>
<th>c.</th>
<th>d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain the nature of managerial work in a variety of forms of organisations, and the impact of the external environments, both domestic and global, on managers' jobs. (Outcome 7).</td>
<td>Analyse business situations and problems in contemporary business settings. (Outcome 11).</td>
<td>Identity teamwork, leadership and decision making process in the business environment. (Outcome 8).</td>
<td>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.</td>
</tr>
</tbody>
</table>

## Subject Synopsis/Indicative Syllabus

### Management Functions
- Planning
- Organising
- Leading
- Controlling

### Social Responsibility and Managerial Ethics
- Arguments for and against social responsibility as a business objective.
- Factors affecting management ethics.

### Core Textbooks

- Prominent reference textbooks for the subject, including the lecture notes and supplementary readings.

## Teaching/Learning Methodology

### Examination
- Continuous Assessment 50%
- Examination 50%

### 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. Individual Work - 20%</td>
<td>√</td>
<td>a. b. c. d.</td>
</tr>
<tr>
<td>2. Group Project - 15%</td>
<td>√ √ √</td>
<td>a. b. c. d.</td>
</tr>
<tr>
<td>3. Participation - 15%</td>
<td>√ √ √ √</td>
<td>a. b. c. d.</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.
Feedback is given to students immediately following the presentations and all students are invited to join this discussion.

**Student Study Effort Expected**

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lectures  28 Hrs.</td>
</tr>
<tr>
<td>• Tutorials  14 Hrs.</td>
</tr>
</tbody>
</table>

Other student study effort:

| • Preparation for lectures/ seminars  42 Hrs. |
| • Preparation for individual work/ group project/ examination  42 Hrs. |

Total student study effort  126 Hrs.

**Reading List and References**

**Recommended Textbooks**


**Reference Textbooks**


**Indicative Periodicals & Newspapers Readings**
Company Annual Reports
The Asian Wall Street Journal
The Economist
South China Morning Post
Business Week

**Indicative Journal Readings**
Academy of Management Journal
Academy of Management Review
Asia Pacific Journal of Management
Journal of Management
Journal of Organizational Behavior
Human Relations
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>MM4522</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>China Business 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>Exclusion: China Trade Management (MM4521)</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. (Outcome 7)

b. explain and assess the institutional and legal issues of doing business in China. (Outcome 4)

c. describe, analyse and evaluate business strategies and practices in China. (Outcome 4)

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. (Outcome 4 & 8)

e. have further developed their oral and written communication skills (Outcome 1)

**Subject Synopsis/ Indicative Syllabus**

- The economic system and economic reforms in China
- Understanding the Chinese bureaucracy
- China's integration into the global economy
- China - Hong Kong Business relations
- The regulations of China's foreign trade
- China's tax system
- Foreign direct Investment and management
- Marketing strategies in China

**Teaching/Learning Methodology**

Lectures, tutorial discussion, group project (presentation and written report)

---

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

<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 e</td>
</tr>
<tr>
<td>1. Group Project</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Presentation</td>
<td>15%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Written Report</td>
<td>15%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4. Class Participation</td>
<td>20%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Examination</td>
<td>50%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

Total 100%

*Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.

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

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

The various methods are designed to ensure that all students taking this subject –

The assessments are designed to motivate the students to read the recommended materials and participate in the required activities to achieve the learning outcomes.

**Student Study Effort Expected**

| Class contact: |
| Lecture | 28 Hrs. |
| tutorial | 14 Hrs. |

**Other student study effort:**

- Group project | 20 Hrs. |
- Reading | 28 Hrs. |

Total student study effort | 90 Hrs.
<table>
<thead>
<tr>
<th>Reading List and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course does not have a textbook. Readings are drawn from <em>China Handbook</em>, a database compiled and edited by the Economist Intelligence Unit, and <em>China Business Review</em>, a publication of the US-China Business Council, and other sources. The readings have been uploaded to WebCT.</td>
</tr>
</tbody>
</table>

**References**

Tim Clissold's *Mr. China* (Constable & Robinson, 2004)


Appendix II

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 the Major/Minor option will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 2.0 or above for the Major programme, Minor programme and overall) and have also submitted an application for graduation.

If the 18 credits taken for the Minor study can meet the requirements for a specific Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. 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.

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
- Satisfying the co-curricular activities requirements
- A pass in Foundation Mathematics (AMA106)*

* It is only applicable to admittees who do not have a ‘pass’ in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201 stipulated in the curriculum. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who 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.

# 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.
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>
</tr>
</thead>
<tbody>
<tr>
<td>AMA201 Mathematics I</td>
</tr>
<tr>
<td>ELC2501 University English I (2 credits)</td>
</tr>
<tr>
<td>ENG224 Information Technology</td>
</tr>
<tr>
<td>ENG232 Engineering Science</td>
</tr>
<tr>
<td>ENG236 Computer Programming (2 credits in semester 1)</td>
</tr>
<tr>
<td>ENG237 Basic Electricity and Electronics I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA202 Mathematics II</td>
</tr>
<tr>
<td>CBS2080 Fundamentals of Chinese Communication</td>
</tr>
<tr>
<td>ELC2502 University English II (2 credits)</td>
</tr>
<tr>
<td>EE3061 Analysis Methods for Engineers</td>
</tr>
<tr>
<td>ENG236 Computer Programming (1 credit in semester 2)</td>
</tr>
<tr>
<td>ENG238 Basic Electricity and Electronics II</td>
</tr>
<tr>
<td>GEC2801 or equivalent China Studies (2 credits)</td>
</tr>
</tbody>
</table>

*(1 subject from the Minor Programme)*

<table>
<thead>
<tr>
<th>IC2105 Engineering Communication and Fundamentals (120 hours throughout the year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC2112 IC Training I (EE) (4 weeks in summer)</td>
</tr>
</tbody>
</table>

**Typical Second Year Study:**

<table>
<thead>
<tr>
<th>Semester One</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELC3504 English for Effective Workplace Communication (1 credit in semester 1)</td>
</tr>
<tr>
<td>EE2011 Applied Electromagnetics</td>
</tr>
<tr>
<td>EE3011 Analogue and Digital Circuits</td>
</tr>
<tr>
<td>EE3041 Power Transmission and Distribution</td>
</tr>
<tr>
<td>EE3131 Telecommunication Fundamentals</td>
</tr>
<tr>
<td>GEC2xxx Broadening General Education Subject (2 credits)</td>
</tr>
</tbody>
</table>

*(1 subject from the Minor Programme)*

<table>
<thead>
<tr>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELC3504 English for Effective Workplace Communication (1 credit in semester 2)</td>
</tr>
<tr>
<td>EE3021 Electromechanical Energy Conversion</td>
</tr>
<tr>
<td>EE3031 Power Electronics and Drives</td>
</tr>
<tr>
<td>EE3111 Project Methodologies (2 credits)</td>
</tr>
<tr>
<td>EE3121 Computer System Principles</td>
</tr>
<tr>
<td>EE321 Electrical Services in Buildings</td>
</tr>
</tbody>
</table>

*(1 subject from the Minor Programme)*

<table>
<thead>
<tr>
<th>EE3502 Semester Three (Summer Period at the end of Year 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Practical Training (6 weeks in summer)</td>
</tr>
</tbody>
</table>
Typical Final Year Study:

<table>
<thead>
<tr>
<th></th>
<th>Semester One</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></th>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG307</td>
<td>Society and the Engineer</td>
</tr>
<tr>
<td></td>
<td>One EE level-4 elective</td>
</tr>
<tr>
<td></td>
<td>An additional subject of 3 credits (any subject from level 1 to level 4)</td>
</tr>
</tbody>
</table>

(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. Classification of Award

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

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