Department of Electronic and Information Engineering

Higher Diploma Programme in

Electronic and Information Engineering

Full-time Credit-based

Code: 42075

Programme Booklet

2010/2011

HIGHER DIPLOMA IN ELECTRONIC AND INFORMATION ENGINEERING

Contents

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

1. GENERAL INFORMATION

1.1 Cohort of Intakes

This programme booklet is the definitive programme document for the 2010/11 cohort of intakes. Just in case any updated information is necessary after the publication of this booklet, students are requested to refer to the URL http://www.eie.polyu.edu.hk/prog/hd.html for the most updated information. Should any discrepancy between the contents of the booklet and University regulations arise, University regulations always prevail.

1.2 Programme Information

Title of Programme	**Higher Diploma in Electronic and Information Engineering**
Host Department	Department of Electronic and Information Engineering
Mode of Attendance	Full-time (predominantly in the daytime)
Duration	Normally 2 years, maximum 4 years
Programme Structure	Credit-based
Total Credits for Graduation	60 (plus 10 practical training credits)
Final Award	Higher Diploma in Electronic and Information Engineering 電子及資訊工程學高級文憑

2. RATIONALE AND AIMS OF THE PROGRAMME

This programme aims at producing graduates with the professional knowledge and skills that are relevant for a professional technologist in the field of electronic and information engineering. This programme is designed to equip students with background knowledge necessary to start their careers as technologists in the electronic and information engineering discipline upon graduation.

The curriculum is designed to train students to meet the needs of the electronic and information industry, in both manufacturing and servicing sectors. The local manufacturing industry requires incorporated engineers in the areas of design, research and development (R&D), testing, and quality control (QC). The servicing sector of the industry mainly consists of service providers in the field of telecommunications, sales of electronic and information products such as computers and

electronic equipments that require trained technical personnel for maintenance, customer service, field applications, technical support and marketing.

3. INTENDED LEARNING OUTCOMES OF THE PROGRAMME*

Category A Professional/academic knowledge and skills

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

1. demonstrate knowledge and understanding of concepts, principles and theories relating to electronic and information engineering;
2. apply analytical skills, simulation techniques, and modern engineering tools necessary for engineering practice;
3. apply knowledge of mathematics and scientific principles to modelling and solving real-life engineering problems;
4. identify, analyze and solve technical problems in electronic and information engineering;
5. assist in the design and development of products relevant to the field of electronic and information engineering;
6. apply computer programming techniques to solving engineering problems in workplace.

Category B Attributes for all-roundedness

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

7. communicate effectively;
8. demonstrate critical and creative thinking;
9. demonstrate self-learning and life-long learning capability;
10. work in a team and collaborate effectively with others;
11. have an understanding of professional and social responsibilities;
12. exercise leadership when working in a team.

** The University 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, biliteracy and trilingualism, and entrepreneurship) will be 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.*

4. ENTRANCE REQUIREMENTS

Candidates should satisfy both the general minimum entrance requirements of The Hong Kong Polytechnic University AND the programme-specific requirements for 2-year Full-time Higher Diploma Programme as set out below.

4.1 University General Minimum Entrance Requirements

(i) For those applying on the basis of HKALE:

- E in one HKALE subject, or E in two HKALE(AS-Level) subjects; AND
- E in six HKCEE subjects including English Language (Syllabus B)* and Chinese Language* or Chinese Literature or a language other than Chinese and English

(ii) For those applying on the basis of other local qualifications:

- An appropriate Diploma or Higher Certificate (as specified in section 4.2 below) from The Hong Kong Polytechnic University or the Hong Kong Institute of Vocational Education (IVE) – formerly the Hong Kong Technical Institute (TI) and the Hong Kong Technical College (TC)

4.2 Programme-specific Minimum Entrance Requirements

(i) For those applying on the basis of HKALE:

- HKALE Grade E or above in one of the following subjects: Physics; Engineering Science; Pure Mathematics; Applied Mathematics; Chemistry or Computer Studies; OR
- HKALE (AS-Level) Grade E or above in two of the following subjects: Physics; Electronics; Design and Technology; Mathematics and Statistics; Applied Mathematics; Chemistry or Computer Applications; PLUS
- HKCEE Grade D or above in Mathematics or Additional Mathematics (only required for applicants without a pass in HKALE Applied Mathematics or Pure Mathematics; OR in HKALE (AS-Level) Applied Mathematics or Mathematics and Statistics); AND
- HKCEE Grade E or above in Physics or Engineering Science (only required for applicants without a pass in HKALE Physics or Engineering Science; OR in HKALE (AS-Level) Physics or Electronics or Design and Technology).

* For attempts in 2007 and after, at least Level 2 is required.

(ii) For those applying on the basis of other qualifications:

- A Higher Certificate in Electronic Engineering, Electrical Engineering, Electronic and Communications Engineering, Computer and Information Engineering, or a related discipline; OR
- A Diploma in Electronic and Communications Engineering, Computer and Information Engineering, or a related discipline.

5. PROGRAMME, SUBJECTS, AND CREDITS

Most of the subjects in the programme are of the standard credit value of 3 credits each. The programme includes Level 2 and Level 3 subjects. ('Level' of a subject indicates the intellectual demand placed upon students.)

5.1 A summary of the subjects in the programme is shown in the following table:

Subject		Status	Level	Credits	Pre-requisite
AMA203	Mathematics IA	COM	2	3	nil
AMA204	Mathematics IIA	COM	2	3	AMA203
EIE251	Electronic Circuits I	COM	2	3	nil
EIE252	Electronic Circuits II	COM	2	3	EIE251
EIE258	Electronic Design Practice	COM	2	2	EIE251
EIE261	Logic Design	COM	2	3	nil
EIE264	Computer Programming	COM	2	3	nil
EIE282	Information Technology	COM	2	3	nil
General Education Subject – China Studies*		COM	2	2	nil
COMP350	Computer Graphics	ELE	3	3	EIE264
EIE350	Higher Diploma Project	COM	3	6	nil
EIE351	Analogue and Digital Integrated Circuits	COM	3	3	EIE251, EIE252 EIE261
EIE361	Computer System Fundamentals	COM	3	3	EIE373
EIE362	Linear Systems	COM	3	3	AMA203
EIE373	Microcontroller Systems and Interface	COM	3	3	EIE261
EIE374	Signal Processing Applications	ELE	3	3	EIE362
EIE375	Object Oriented Design and Programming	ELE	3	3	EIE264
EIE380	Web-based Multimedia	ELE	3	3	nil
EIE381	Communication Fundamentals	COM	3	3	AMA203, AMA204
EIE399	Data Communications	ELE	3	3	nil
ELC3503	English for Engineering Students	COM	3	2	nil
ENG305	Engineering Management A	COM	3	3	nil
IC292	Industrial Centre Training	TRN	2	10 (training credits)	nil

* For details about General Education subject syllabi, please refer to "China Studies Brochure" published by the University.

5.2 Specified Progression Pattern

In order to be eligible for the award, students have to accumulate 60 credits, (excluding the training credits from practical training), pass all compulsory subjects and practical training in the Industrial Centre (IC292).

(All compulsory subjects are non-deferrable.)

Year 1

Semester 1 Compulsory subjects :

AMA203	Mathematics IA
EIE251	Electronic Circuits I
EIE261	Logic Design
EIE264	Computer Programming
ELC3503	English for Engineering Students
-	China Studies#
IC292*	Industrial Centre Training

Semester 2 Compulsory subjects :

AMA204	Mathematics IIA
EIE252	Electronic Circuits II
EIE258	Electronic Design Practice
EIE264	Computer Programming (continued)
EIE282	Information Technology
EIE362	Linear Systems
IC292*	Industrial Centre Training (continued)

* Students have to undergo practical training in the Industrial Centre in Year 1 term time and summer.

\# Students are free to take this 2-credit China Studies subject in any semester in Year 1 or Year 2.

Year 2

Semester 1 Compulsory subjects :

EIE350	Higher Diploma Project
EIE351	Analogue and Digital Integrated Circuits
EIE373	Microcontroller Systems and Interface
EIE381	Communication Fundamentals
ENG305	Engineering Management A

Semester 2 Compulsory subject :

EIE350	Higher Diploma Project (continued)
EIE361	Computer System Fundamentals

Electives (choose THREE subjects) :

EIE374	Signal Processing Applications
EIE375	Object Oriented Design and Programming
EIE380	Web-based Multimedia
EIE399	Data Communications
COMP350	Computer Graphics

Note : Students are normally expected to follow the specified progression pattern. Approval from the Department is required if students do not wish to follow the specified pattern.

5.3 University Language Requirements

5.3.1 Students are expected to possess the general standard of language proficiency through the secondary school education prior to their admission to the University as follows:

(i) English and Written Chinese

Students with overall grade “A” or “B” in HKALE(AS-level) Use of English and Chinese Language & Culture shall be considered as possessing the respective general standards of language proficiency, and thus shall be exempted from taking the respective Language Enhancement Programmes (LEP).

Students with overall grade “C” in HKALE(AS-level) Use of English and Chinese Language & Culture shall generally be considered as possessing the respective

general standards of language proficiency. But if they possess component grade(s) lower than "C", they shall be required to complete the respective LEP modules prescribed for them.

(ii) Putonghua

Students shall be assessed through the entrance test on Putonghua provided by CBS upon commencement of their programme of study at the University to determine if they shall be required to take the Putonghua LEP.

Students with grade "A" or "B" in HKCEE Putonghua shall be considered as possessing the general standard of Putonghua proficiency, and thus shall be exempted from taking the required Putonghua LEP.

Students with grade "C" in HKCEE Putonghua shall generally be considered as possessing the general standard of Putonghua proficiency. But they will be assessed again through the entrance test on Putonghua provided by CBS upon commencement of their programme of study to determine if they shall be required to take the Putonghua LEP.

5.3.2 Benchmarking mechanisms will be established for assessing students' general standard of language proficiency upon admission, in order that appropriate enhancement can be provided, where necessary, to help them achieve the desired standard upon graduation.

(i) English and Written Chinese

HKALE(AS-level) Use of English and Chinese Language & Culture subjects shall be adopted as the benchmarking mechanisms.

Native speakers of English shall by default be given exemption. Exemption requests on other grounds shall be considered on a case-by-case basis.

(ii) Putonghua

CBS's entrance test on Putonghua and HKCEE Putonghua subject shall be adopted as the benchmarking mechanisms for assessing students' general levels of Putonghua proficiency upon admission.

Native speakers of Putonghua shall by default be given exemption. Exemption requests on other grounds shall be considered on a case-by-case basis.

5.3.3 To enable students to be equipped with the necessary generic language skills to pursue their studies as well as to attain the level of proficiency up to University's desired standard, appropriate non-credit bearing enhancement programmes will be provided to students in accordance with their proficiency level as identified in the entry assessment as specified in Section 5.3.1 above.

(i) Non-credit Bearing Language Enhancement Programmes

Non-credit bearing Chinese/English Language Enhancement Programmes (LEPs) shall be prescribed and provided by CBS/ELC for individual students in respect of their proficiency levels.

Students are expected to complete the LEPs prescribed by CBS and/or ELC before their graduation. Nevertheless, non-completion of the respective LEP(s) will not affect students' eligibility for graduation.

(ii) Graduating Student's Language Proficiency Assessment (GSLPA)

GSLPA will be made available to all UGC-funded full-time Higher Diploma and self-financed full-time Bachelor's degree students, but only on a voluntary basis for the time being. These students will not be required to pay any fee for taking the test, and no statement related to the completion of GSLPA will be included in the student's academic transcript.

Students on UGC-funded full-time Higher Diploma and self-financed full-time Bachelor's degree programmes can seek assistance from the two Language Centres for the provision of Language Enhancement Programmes (LEPs) on a voluntary basis. However, priority for these (LEPs) will be given to UGC-funded Bachelor's degree students.

5.4 Practical Training

In Year 1, students will undergo a practical training of 10 weeks in the Industrial Centre. Detailed contents of the training are given in the subject syllabus of IC292. Specifically, the training encompasses engineering drawing and CAD, scientific computing practice, industrial safety, business software application and technical practice in electronic and

information engineering (EIE). The objective of the training is to equip students with hands-on ability for academic and professional career development in EIE. About 4 weeks of training will be scheduled during Year 1 term time and the other 6 weeks will be scheduled in Year 1 summer term. The number of training credits for practical training is 10. Practical training is graded at any time when an assessment is made, just similar to other academic subjects. Only ONE aggregate grade will be given based on the performance of the student in his/her training completed in Year 1 and the grade will be reported during Semester 1 of Year 2. Students have to pass the practical training in order to be qualified for graduation, but no weighting will be contributed from the practical training in the calculation of the Weighted GPA for graduation and consideration of award classification. In addition, the training credits will NOT be counted towards meeting the credit requirement for students holding full-time status as defined by the University.

6. DEPARTMENTAL UNDERGRADUATE PROGRAMME COMMITTEE

6.1 The composition of the Departmental Undergraduate Programme Committee is decided by the Head of Department and normally, it consists of Programme Leaders of all degree and higher diploma programmes hosted by the Department, Head of Department, representative from the Departmental Learning and Teaching Committee, teaching staff representatives, representatives from major serving departments and student representatives. The Committee is responsible for programme review and development.

6.2 The Committee will collect and consider, on a regular basis, the views of students and other key stakeholders on the relevance and currency of the syllabi, the standards of the examinations, the development of the programme, the adequacy of resources and the local and worldwide trends related to learning and teaching, for the continuous improvement of the programmes.

7. "REGULAR" STUDENTS, "SELF-PACED" STUDENTS, AND STUDENT STATUS

7.1 Students' eligibility for the range of services provided by the University will be governed by the students' status, which is determined with reference to the mode of attendance of the academic programmes enrolled and/or the study load as described in Sections 7.5 to 7.7 below.

7.2 Students are normally expected to follow the specified progression pattern. These are referred to as "regular" students. Those students who have been given special approval by

the Programme Leader and the Head of Department for not following the specified pattern are referred to as "self-paced" students.

7.3 Students who register on programmes without any specified progression pattern are also known as self-paced students.

7.4 Self-paced students, either accelerated or decelerated, are required to seek counselling and approval from the Programme Leader and the Head of Department.

Student status:

7.5 Students enrolling on full-time/sandwich programmes or mixed-mode programme, with a study load of 9 credits or more in a semester, are classified as full-time students. Students on full-time/sandwich programmes who wish to change their status, from full-time to part-time, i.e. enrolling for less than 9 credits in a semester, will have to seek prior approval from their Department [please also refer to Section 11.6 (i)].

7.6 (i) Students enrolling on part-time, distance learning, online, and mixed-mode programmes, with a study load of less than 9 credits in a semester, are classified as part-time students.

(ii) Students who enroll on full-time programmes but have been given permission to take less than 9 credits in a semester will be given the option to pay credit fees. If students wish to exercise such option, they have to inform the Department before the end of the add/drop period of that semester. These credit-fee-paying students are classified as part-time students for that semester.

7.7 Students enrolling on mixed-mode programmes are classified as mixed-mode students. They may engage in a full-time or part-time study load and attend classes either in the evening, in the daytime, or a combination of both. If the mixed-mode students take subjects with a study load reaching the minimum requirement of a full-time student, they will be given full-time status in that semester. Otherwise, they will be given part-time status.

7.8 Students who wish to take individual subjects, but do not wish to register as a candidate for an award, are classified as subject-based students.

8. SUBJECT REGISTRATION (INCLUDING ADD / DROP / WITHDRAWAL OF SUBJECTS)

8.1 In addition to programme registration, students need to register for the subjects at specified periods prior to the commencement of the semester. An add/drop period will also be scheduled for each semester. 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). Applications submitted after the commencement of the examination period will not be considered. 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.

8.2 Students may register subjects for the following semester with reference to the subject results decided by the Subject Assessment Review Panel.

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

8.4 Subject to the maximum study load of 21 credits per semester and the availability of study places, students are allowed to take additional subjects on top of the prescribed credit requirement for award before they become eligible for graduation. For students of full-time programmes, they can take additional subjects from within or outside their programme curriculum. Students can choose freely from those subjects which are available for selection (unless they are barred because of pre-requisites).

9. ZERO SUBJECT ENROLMENT

No students will be allowed not taking subject in any semester unless they have obtained prior approval from the Programme Leader and the Head of Department and in any case not later than the end of the add/drop period; otherwise they will be classified as having unofficially withdrawn from their programme. Students who have been approved for zero subject enrolment (i.e. not taking any subject in a semester) are allowed to retain their student status and continue using campus facilities

and library facilities. Any semester in which the students are allowed not taking subject will nevertheless be counted towards the maximum period of registration.

10. SUBJECT EXEMPTION

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

11. CREDIT TRANSFER

11.1 Students may be given credits for recognised previous studies (including mandatory language or general education subjects) and the credits will be counted towards meeting the requirements for award. Transferred credits may be counted towards more than one award. The granting of credit transfer is a matter of academic judgment. In assessing the transferability of subjects previously taken, the syllabus of that subject should be carefully scrutinized to ascertain that it is comparable to the PolyU's curriculum. Whether the previous studies are from institutions on credit-based or non-credit-based system should not be a matter of concern, and the subject size need not be a perfect match. To ascertain the academic standing of the institution offering the previous studies, the Department might need to request the institutions concerned to provide more relevant information.

11.2 Credit transfer may be done with or without the grade being carried over; the former should normally be used when the credits were gained from PolyU. Credit transfer with the grade being carried over may be granted for subjects taken from outside the University, if deemed appropriate, and with due consideration to the academic equivalence of the subjects concerned and the comparability of the grading systems adopted by the University

and the other approved institutions. Subject credit transfer is normally decided by the subject offering Department (for "Broadening" GE subjects, however, the decision will be made by the programme offering Department). However, for applications which are submitted by students who have completed an approved student exchange programme, the decision will be made by the programme offering Department in consultation with the subject offering Departments. As the application for credit transfer may involve subjects offered by more than one Department, the programme offering Department should coordinate and check whether the maximum limit for credit transfer for a student has been exceeded, and whether the student has fulfilled the residential requirement of the University.

11.3 In case of disagreement between the programme offering Department and the subject offering Department, the two Faculty Deans/School Board Chairmen concerned will make a final decision jointly on the application.

11.4 Normally, not more than 50% of the credit requirement for award may be transferable from approved institutions outside the University. For transfer of credits from programmes offered by PolyU, normally not more than 67% of the credit requirement for award can be transferred. In cases where both types of credits are being transferred (i.e. from programmes offered by PolyU and from approved institutions outside the University), not more than 50% of the credit requirement for award may be transferred.

11.5 If the transferred credits are part of a PolyU programme which is accredited by a professional body, the Department concerned should ensure that the transferred credits will also meet the requirement of the relevant professional body.

11.6 If a student is waived from a particular stage of study on the basis of advanced qualifications held at the time of admission, the student concerned will be required to complete fewer credits for award. For these students, the exempted credits will be counted towards the maximum limit for credit transfer when students apply for further credit transfer after their admission.

11.7 Notwithstanding the upper limits stipulated in Section 11.4 above, (and unless professional bodies stipulate otherwise) students may be given more credit transfer than these upper limits (e.g. upon completion of exchange activity as mentioned in Section 11.8 below), subject to their satisfying the residential requirement.

11.8 Credit transfer can be applicable to credits earned by students through study at an overseas institution under an approved exchange programme. Students should, before they go abroad for the exchange programme, seek prior approval from the programme

offering Department (who will consult the subject offering Departments as appropriate) on their study plan and credit transferability. As with all other credit transfer applications, the Departments concerned should scrutinise the syllabuses of the subjects which the students are going to take at the overseas institution, and determine their credit transferability based on academic equivalence with the corresponding subjects on offer at the PolyU, and the comparability of the grading systems adopted by PolyU and the overseas institution. The transferability of credits, and the suitability for allowing grades to be carried over, must be determined and communicated to students before they go abroad for the exchange programme. In order to overcome the problems associated with subject-to-subject mappings, block credit transfer rather than subject-by-subject credit transfer can be given.

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

12. DEFERMENT OF STUDY

12.1 Students may apply for deferment of study if they have a genuine need to do so such as illness. Approval from the Programme Leader and the Head of Department is required. The deferment period will not be counted as part of the maximum period of registration.

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

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

12.4 Students who have been approved for deferment are not entitled to enjoy any campus facilities during the deferment period.

13. PRINCIPLES OF ASSESSMENT

13.1 The prime purpose of assessment is to enable students to demonstrate that they have met the aims and objectives of the academic programme, in particular that they have fulfilled

the requirement of each subject and have, at the end of their study achieved the standard appropriate to the award. Appropriate methods of assessment will be employed to achieve this purpose. The assessment methods will also allow discrimination between the performance of students in each subject.

13.2 Assessment will also serve as feedback to students. Students will be informed of their performance in the assessment so that they are aware of their progress and attainment.

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

14. ASSESSMENT METHODS

14.1 Students' performance in a subject shall be assessed by continuous assessment and/or examinations. Where both methods are used, the weighting of each in the overall subject grade will be clearly stated in the syllabus.

14.2 Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately.

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

14.4 At the beginning of each semester, the subject teacher will inform students of the details of the methods of assessments to be used in the subject concerned.

15. SUBJECT ASSESSMENT REVIEW PANEL (SARP)

SARP consists of the Head of the Department (as Chairman), the Programme Leader and the relevant subject examiners. SARP is responsible for monitoring the academic standard and quality of subjects and ratifying of subject grades. The Panel will review the distribution of grades within a

subject and finalize the grades at the end of each semester before submission to the Board of Examiners. The Board of Examiners will not attempt to change any grades.

16. BOARD OF EXAMINERS (BoE)

16.1 The BoE will meet 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) and is responsible to the Senate for making:

(i) a decision on the classification of awards to be granted to each student on completion of the programme;

(ii) a decision on deregistration cases; and

(iii) a decision on cases with extenuating circumstance.

16.2 These decisions are made by the full BoE at the end of each semester in the light of the standard of student achievement appropriate to the award to which the programme is designed to lead, the aims of the programme, the performance on the programme in previous years, the general assessment regulations of the University and the specific programme regulations, and good practice established in the University and elsewhere.

16.3 The BoE will not attempt to change the grades for any student in any subject nor condone failures. The above decisions of the BoE, except those on award and deregistration cases which are straight forward, will be ratified by the Faculty Board. The Faculty Board may refer the decisions back to the BoE for further consideration and explanation.

16.4 Any decisions by the BoE outside the general assessment regulations of the University, supported by the Faculty Board, shall be referred to the VP(AD) for ratification. All such cases shall be reported to the Senate. Decisions by BoE outside the programme regulations but within the general assessment regulations of the University fall within the authority of the Faculty Board.

16.5 Students shall be formally notified of decisions affecting them after the BoE meeting except for those cases which require ratification of the Faculty Board. These latter students shall be formally notified of decisions after the Faculty Board's ratification or, if a decision is outside the general assessment regulations, after the VP(AD) ratifies that decision. Any prior communication of results to these students shall be subject to formal ratification.

17. PROGRESSION / ACADEMIC PROBATION / DEREGISTRATION

17.1 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.

17.2 When a student has a Grade Point Average (GPA) (see Section 21.3 below) lower than 2.0, he/she will be put on academic probation in the following semester. Once when a student is able to pull his GPA up to 2.0 or above at the end of the probation semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in transcript of studies.

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

(i) the student has exceeded the maximum period of registration for the programme as specified in this programme booklet; or

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

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

17.4 The progression of students to the following academic year will not be affected by the GPA obtained in Summer Term, unless the programme enrolled falls into the category described in Section 17.5 below and otherwise specified in this programme booklet.

17.5 Exceptions to Section 17.4 above could only be made if the Summer Term study is mandatory for all students of the programme and that the study constitutes a substantial requirement for graduation.

17.6 Notwithstanding Sections 17.3(ii) and 17.3(iii) above, a student may be deregistered from the programme enrolled before the time specified in Sections 17.3(ii) and 17.3(iii) above if his academic performance is poor to the extent that the Board of Examiners deems that his chance of attaining a GPA of 2.0 at the end of the programme is slim or impossible.

17.7 In the event that there are good reasons, the Board of Examiners has the discretion to recommend that students who fall into categories as stated in Sections 17.3(ii) or 17.3(iii) above be allowed to stay on the programme, and these recommendations should be presented to the relevant Faculty/School Board for final decision.

17.8 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, the recommendation (to reverse the previous decision to deregister the student) will also be presented to the relevant Faculty Board for final decision.

18. APPEAL AGAINST ASSESSMENT RESULTS

A student may appeal against a decision of a Subject Assessment Review Panel or the Board of Examiners within 7 working days upon the public announcement of the examination results. The procedures for appeals against examination results are detailed in the Student Handbook.

19. RETAKING OF SUBJECTS

19.1 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.

19.2 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.).

19.3 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.

20. EXCEPTIONAL CIRCUMSTANCES

Absence from an assessment component

20.1 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 Assessment Review Panel as legitimate, the Panel 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.

Aegrotat award

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

20.3 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.

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

20.5 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.

Other particular circumstances

20.6 A student's particular circumstances may influence the procedures for assessment but not the standard of performance expected in assessment.

21. GRADING

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

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

'F" is a subject failure grade, whilst all others ('D' to 'A+') are subject passing grades. No credit will be earned if a subject is failed.

21.2 A numeral grade point is assigned to each subject grade, as follows:

Grade	***Grade Point***
A+	4.5
A	4
B+	3.5
B	3
C+	2.5
C	2
D+	1.5
D	1
F	0

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

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

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

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

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

A Subject which has been given an "S" subject code, i.e. absent from examination, will be included in the GPA calculation and will be counted as "zero" grade point. GPA is thus the unweighted cumulative average calculated for a student, for all relevant subjects taken

from the start of the programme to a particular reference point of time. GPA is an indicator of overall performance and is capped at 4.0.

22. ELIGIBILITY FOR AWARD

22.1 In order to be eligible for the award, a student is required to accumulate 60 credits (including passing all compulsory subjects and having a GPA of 2.0 or above at the end of the programme), and fulfill the University language requirements as set out in Section 5.3 and pass the practical training at the Industrial Centre.

22.2 A student is required to graduate as soon as he/she satisfies all the conditions for award as set out in Section 22.1 above.

22.3 Subject to the maximum study load of 21 credits per semester, a student may take more credits than he/she needs to graduate up to a maximum of 9 credits on top of the prescribed credit requirements for his/her award in or before the semester within which he/she becomes eligible for award.

23. GUIDELINES FOR AWARD CLASSIFICATION

23.1 The guidelines for award classification are stated in the following. In using these guidelines, 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.

23.2 This programme uses Weighted GPA as a guide for helping to determine award classifications. The weighting given for Level 2 subjects (including language and general studies) is 0.2, and the weighting given for Level 3 subjects is 0.4. The weighting given for Practical Training is zero. The weighting of each level is a measure of the relevance of the level to the classifications of the award.

Weighted GPA will be computed as follows:

$$\text{Weighted GPA} = \frac{\sum_{n} \text{Subject Grade Point} \times \text{Subject Credit Value} \times W_i}{\sum_{n} \text{Subject Credit Value} \times W_i}$$

where W_i = weight assigned according to the level of the subject.

n = number of all subjects counted in GPA calculation as set out in Section 21.3, except those exclusions specified in Section 23.3.

Same as GPA, Weighted GPA is capped at 4.0.

23.3 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. However, if a student attempts more elective subjects (or optional subjects) than those required for graduation in or before the semester in which he/she becomes eligible for award, the elective subjects (or optional subjects) with a higher grade/contribution shall be included in the grade point calculation (i.e. the excessive subjects attempted with a lower grade/ contribution, including failed subjects, will be excluded).

23.4 The following are guidelines for Board for Examiners' reference in determining award classifications:

Classification	**Guidelines**
Distinction	The student's performance/attainment is outstanding, and identifies him/her as exceptionally able in the field covered by the programme in question.
Credit	The student has reached a standard of performance/attainment which is more than satisfactory but less than outstanding.
Pass	The student has reached a standard of performance/attainment ranging from just adequate to satisfactory.

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

Classification	**Weighted GPA**
Distinction	3.7^{+} – 4
Credit	3.2^{+} – 3.7^{-}
Pass	2.0 – 3.2^{-}

Note: "+" sign denotes 'equal to or more than'; "–" sign denotes 'less than'.

23.6 There is no requirement for the Board of Examiners to produce an award list which conforms to the guidelines in Section 23.5 above.

24. CURRICULUM MAP

(Please see page 26.)

25. SYLLABI

(Please see pages 27 to 107.)

CURRICULUM MAP
Alignment of Subjects with Programme Intended Learning Outcomes

	Programme Intended Learning Outcomes	AMA203*	AMA204*	COMP350#	EIE251*	EIE252*	EIE258*	EIE261*	EIE264*	EIE282*	EIE350*	EIE351*	EIE361*	EIE362*	EIE373*	EIE374#	EIE375#	EIE380#	EIE381*	EIE399#	ELC3503*	ENG305*	IC292*
1	Ability to demonstrate knowledge and understanding of concepts, principles and theories relating to electronic and information engineering	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
2	Ability to apply analytical skills, simulation techniques, and modern engineering tools necessary for engineering practice	✓	✓		✓	✓	✓	✓			✓	✓		✓	✓	✓			✓	✓			✓
3	Ability to apply knowledge of mathematics and scientific principles to modelling and solving real-life engineering problems	✓	✓			✓					✓								✓	✓			✓
4	Ability to identify, analyze and solve technical problems in electronic and information engineering	✓	✓					✓			✓		✓						✓	✓			✓
5	Ability to assist in the design and development of products relevant to the field of electronic and information engineering										✓		✓						✓				✓
6	Ability to apply computer programming techniques to solving engineering problems in workplace			✓					✓		✓		✓		✓		✓	✓	✓				✓
7	Ability to communicate effectively	✓	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
8	Ability to demonstrate critical and creative thinking	✓	✓	✓		✓		✓			✓		✓		✓				✓	✓			✓
9	Ability to demonstrate self-learning and life-long learning capability	✓	✓								✓		✓				✓						✓
10	Ability to work in a team and collaborate effectively with others			✓	✓	✓	✓	✓	✓		✓	✓						✓					✓
11	Ability to have an understanding of professional and social responsibilities										✓												✓
12	Ability to exercise leadership when working in a team					✓					✓	✓										✓	✓

Note:

* Compulsory subject
\# Elective subject
✓ Supports this programme intended learning outcome

EIE Subject Title

EIE251 Electronic Circuits I
EIE252 Electronic Circuits II
EIE258 Electronic Design Practice
EIE261 Logic Design
EIE264 Computer Programming
EIE282 Information Technology
EIE350 Higher Diploma Project
EIE351 Analogue and Digital Integrated Circuits
EIE361 Computer System Fundamentals
EIE362 Linear Systems
EIE373 Microcontroller Systems and Interface
EIE374 Signal Processing Applications
EIE375 Object Oriented Design and Programming
EIE380 Web-based Multimedia
EIE381 Communication Fundamentals
EIE399 Data Communications

Servicing Subject Title

AMA203 Mathematics IA
AMA204 Mathematics IIA
COMP350 Computer Graphics
ELC3503 English for Engineering Students
ENG305 Engineering Management A
IC292 Industrial Centre Training

Subject Description Form

Subject Code	AMA203
Subject Title	Mathematics IA
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims to introduce students to the fundamentals of basic engineering mathematics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.
Intended Subject 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 techniques and adapt known solutions to different situations of engineering context; 3. develop and extrapolate mathematical concepts in synthesizing and solving engineering problems; 4. search for useful information in problem solving.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 1, 2, 3 and 4. Category B: Attributes for all-roundedness • Programme Outcomes 7, 8 and 9.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Algebra of complex number Complex numbers; Geometric representation; n-th roots of complex numbers. 1. Linear algebra Matrices and determinants; Vector spaces; Elementary algebra of matrices; Eigenvalues and eigenvectors; Normalization and orthogonality. 2. 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 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.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
		1	2	3	4
1. Continuous Assessment	40%	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓
Total	100%				

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

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 Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Mid-term Test and Examination	5 Hours
Other student study effort:	
• Assignments and Self-study	73 Hours
Total student study effort:	120 Hours

Reading List and References

Textbooks:

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, 2nd ed., McGraw-Hill, 2008.

Reference Books:

1. H. Anton, *Elementary Linear Algebra*, 9th ed., John Wiley & Sons, 2004.
2. G.B. Thomas, M.D. Weir and J.R. Hass, *Thomas' Calculus*, 12th ed., Addison-Wesley, 2009.
3. G. James, *Modern Engineering Mathematics*, 4th ed., Prentice-Hall, 2007.

Subject Description Form

Subject Code	AMA204
Subject Title	Mathematics IIA
Credit Value	3
Level	2
Pre-requisite	Mathematics IA (AMA203)
Co-requisite/ Exclusion	Nil
Objectives	This subject aims to introduce students to the fundamentals of basic engineering mathematics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.
Intended Subject 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 techniques and adapt known solutions to different situations of engineering context; 3. develop and extrapolate mathematical concepts in synthesizing and solving engineering problems; 4. search for useful information in problem solving.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 1, 2, 3 and 4. Category B: Attributes for all-roundedness • Programme Outcomes 7, 8 and 9.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Calculus and functions of several variables Infinite series; Power series; Taylor series; Fourier series; Partial differentiation; Maxima and minima; Lagrange multiplier. 2. Partial differential equations Formulation of partial differential equations; Method of separation of variables; Initial and boundary value problems. 3. 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.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
		1	2	3	4
1. Continuous Assessment	40%	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓
Total	100%				

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

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 Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Mid-term Test and Examination	5 Hours
Other student study effort:	
• Assignments and Self-study	73 Hours
Total student study effort:	120 Hours

Reading List and References

Textbooks:

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, 2nd ed., McGraw-Hill, 2008.

Reference Books:

1. H. Anton, *Elementary Linear Algebra*, 9th ed., John Wiley & Sons, 2004.
2. G.B. Thomas, M.D. Weir and J.R. Hass, *Thomas' Calculus*, 12th ed., Addison-Wesley, 2009.
3. G. James, *Modern Engineering Mathematics*, 4th ed., Prentice-Hall, 2007.

Subject Description Form

Subject Code	EIE251
Subject Title	Electronic Circuits I
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This is a foundation subject introducing circuit analysis methods, electronic components and simple analogue circuits.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand circuit operation. 2. Ability to analyze AC and DC circuit problems. 3. Understand the operations of semiconductor devices. 4. Understand the operation of amplifiers. 5. Understand the practical applications of operational amplifiers. Category B: Attributes for all-roundedness 6. Present ideas and findings effectively. 7. Think critically. 8. Learn independently. 9. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of electronic circuits and providing opportunities for students to practice the application of knowledge. • Programme Outcome 2: This subject contributes to the programme outcome through applying of analytical skills, modern simulation tools for engineering problems solving and providing opportunities for students to conduct experiments, analyze, and interpret data. Category B: Attributes for all-roundedness • Programme Outcome 10: This subject contributes to the programme outcome through works in a team environment and collaboration with teammates.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Lumped Circuit Analysis 1.1 Voltage and current sources, resistor, parallel and series circuits, voltage and current divisions, use of Wheatstone Bridge, Kirchhoff's laws, mesh and nodal analyses. 1.2 Dependent sources, Thevenin and Norton theorems, equivalent circuits, source transformations, superposition, maximum power transfer theorem. 1.3 Capacitor and inductor, steady-state DC analysis and transient analysis in RL and RC circuits, time constant. Transformers and coupled inductors. 1.4 AC circuits, *j* notation, steady-state analysis, reactance and susceptance, impedance and admittance, complex number analysis, phasor diagrams, complex power, power triangle and power factor.

	1.5 Dynamic circuit analysis, second-order circuits, linear differential equations, complex frequency, LaPlace equivalent circuits, solutions. 1.6 Resonant circuits, High- and Low-pass filters, frequency response, transfer functions. 2. Introduction to Semiconductor Devices 2.1 Diodes, load line analysis, ideal-diode model, diode applications, rectifier circuits, Zener diodes. 2.2 Bipolar junction transistor (BJT), Filed-effect transistors: JFET, MOSFET, characteristics. 2.3 Operation of BJT: cutoff, saturation, active operations, biasing amplification principle (load-line analysis) based on common-emitter amplifier, graphical interpretation of transconductance and gain. 3. Amplifier Configurations 3.1 Common-emitter amplifier and emitter follower. 3.2 Operational amplifiers, ideal characteristics, inverting and non-inverting amplifiers, summing and difference amplifiers, differentiator, integrator, voltage follower, comparator, etc. 3.3 Operational Amplifier specifications: gain, bandwidth, slew rate, rating, electrical and operating characteristics. 3.4 Differential mode and common mode signals, differential mode and common mode gains, common-mode rejection. 3.5 Practical applications of Operational Amplifiers. **Laboratory Experiments:** Each student is required to complete all the laboratory experiments: 1. Title: Basic electronic measurement techniques Objective: To familiarize students with basic measurement techniques using CROs and digital meters. 2. Title: Kirchhiff's laws, equivalent and maximum power transfer theorem Objective: To verify Kirchhoff's laws applied to resistive networks, and to find equivalent resistance of a network. 3. Title: DC transients in RC circuits Objective: To study the characteristic of dc transients in RC circuits and the operation of an RC relaxation oscillator. 4. Title: Transistor amplifier configurations Objective: To familiarize the students with the common transistor amplifier configurations. 5. Title: Use of 741 Operational Amplifier Objective: To familiarize the students with Op Amp741 Amplifier and its common applications.

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1-5, 7	In lectures, students are introduced to the *knowledge* of the subject. *Comprehension* is strengthened with interactive Q&A and short quizzes. They will be able to *define* and *describe* terms of the subject. They will also be able to *explain* and *generalize* complex structure of knowledge
Tutorials	2, 5, 8, 9	In tutorials, students *apply* what they have learnt in analyzing and solving the assigned problems. They will *analyze* the given information, *compare* and *contrast* different scenarios and propose solutions or alternatives.
Laboratory sessions	1-5, 9	Students perform hands-on tasks in laboratory sessions to strengthen their classroom learning and explore new frontiers. They will be arranged in groups of 2 students to conduct practical measurement for the basic circuits.
Assignments	2, 5, 7, 8	Through working assignments, students can develop a firm understanding and *comprehension* of the *knowledge* taught. They will *analyze* given information and *apply* knowledge in problem solving.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)								
		1	2	3	4	5	6	7	8	9
1. Continuous Assessment (total 40%)										
• Tutorials and short quizzes	10%		✓	✓	✓	✓		✓	✓	
• Laboratory exercises and reports	10%	✓	✓	✓	✓	✓	✓			✓
• Mid-semester test	10%	✓	✓	✓	✓	✓		✓	✓	
• End-of-semester test	10%	✓	✓	✓	✓	✓		✓	✓	
2. Examination	60%	✓	✓	✓	✓	✓	✓	✓	✓	
Total	100%									

The continuous assessment consists of assignments, lab reports, and tests.

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

Specific Assessment Methods/Tasks	Remark
Tutorials and short quizzes	Tutorials and short quizzes are used for assessing their competence level of *knowledge* and *comprehension*, ability to *analyze* given information, ability to *apply* knowledge and skills in new situation.
Laboratory exercises and reports	Students will be required to perform laboratory exercises and write laboratory reports. The emphasis is on assessing their ability to *apply*, *synthesize* and ev*aluate*.
Mid-semester test	A mid-semester test is set to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement.
End-of-semester test and Examination	An end-of-semester test and examination are set to assess students achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given in the first lecture.

Student Study Effort Expected

Class contact (time-tabled):	
• Lectures	28 Hours
• Tutorials	14 Hours
• Laboratory	13 Hours
Other student study effort:	
• Lectures	28 Hours

	• Tutorials	14 Hours
	• Laboratory	3 Hours
	Total student study effort:	100 Hours
Reading List and References	**Textbooks:** 1. A. Hambley, *Electrical Engineering Principle and Applications*, 5th ed., Prentice-Hall, 2011. 2. R. Boylestad and L. Nashelsky, *Electronic Devices and Circuit Theory*, 10th ed., Englewood Cliffs: Prentice-Hall, 2009. **Reference Books:** 1. C.K. Tse, *Linear Circuit Analysis,* London: Addison-Wesley, 1998. 2. W.D. Stanley, *Transform Circuit Analysis for Engineering and Technology*, 5th ed., Prentice-Hall, 2003. 3. J.G. Tront, *PSpice for Basic Microelectronics*, McGraw-Hill International ed., 2008.	

Subject Description Form

Subject Code	EIE252
Subject Title	Electronic Circuits II
Credit Value	3
Level	2
Pre-requisite	Electronic Circuits I (EIE251)
Co-requisite/ Exclusion	Nil
Objectives	This subject introduces the fundamental principles and design of analogue electronic circuits/sub-systems including transistor amplifiers, power amplifiers, feedback circuits, oscillators and dc power supplies. The design will be illustrated with the application of practical ICs where appropriate.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the operation of basic electronic circuits/sub-systems. 2. Analyze basic circuit/sub-system problems. 3. Design basic electronic circuits/sub-systems. Category B: Attributes for all-roundedness 4. Present ideas and findings effectively. 5. Think critically. 6. Learn independently. 7. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamental of electronic circuits and subsystems and providing student with an opportunity to practice the concepts during laboratory sessions. • Programme Outcome 2: This subject contributes to the programme outcome through providing the students with an opportunity to conduct experiments, analyze, and interpret data. • Programme Outcome 3: This subject contributes to the programme outcome through teaching of the fundamental of electronic circuits and subsystems which involve knowledge of mathematics and scientific principles to modelling and solving real-life engineering problems. Category B: Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through laboratory discussions and exchange of ideas. • Programme Outcome 8: This subject contributes to the programme outcome through tutorial exercises. • Programme Outcome 10: This subject contributes to the programme outcome through team working in laboratory sessions. • Programme Outcome 12: This subject contributes to the programme outcome through exercising leadership in team work during laboratory sessions.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Frequency Response of Amplifiers 1.1 Hybrid-pi equivalent circuit of transistors; analysis of voltage and current

	gain, input and output impedance of RC coupled amplifiers. 1.2 Analysis of low frequency and high frequency response of amplifiers; operation of tuned amplifier; effects of cascading amplifiers. 2. Feedback Circuits 2.1 Types of negative feedback and their effects on gain, frequency and phase responses, distortion, noise, input and output impedance. Typical examples of discrete and IC circuits with feedback. 2.2 Design examples of small-signal audio and wideband amplifiers using ICs. 3. Oscillator Circuits Principle of operation of negative-resistance and feedback oscillators; Barkhausen criterion; analysis of typical R-C, L-C and crystal oscillator circuits. Operation of bistable, monostable and astable multivibrators and VCOs; design of pulse generators using monostable and timer ICs. 4. Power Amplifiers 4.1 Classification of power amplifiers; analysis of efficiency, power dissipation and distortion of class A, B, AB and C amplifiers. 4.2 Design considerations of power amplifiers. 5. D.C. Power Supplies Half-wave and full-wave rectifying circuits, filtering of ripples. Series, shunt and switched regulators; the use of regulator ICs. Principles of voltage multipliers. 6. Power Control Devices and Applications Construction, operation and application of UJT, SCR, diac and triac. Analysis of typical single-phase phase-control circuits; protection of SCR and triac; suppression of interference. **Laboratory Experiments:** Each student is required to complete three of the following laboratory experiments: 1. Title: Power Amplifier Objective: To study the waveform, efficiency and crossover distortion in a class AB amplifier. 2. Title: Negative Feedback Amplifier Objective: To design the feedback network for a given amplifier in order to meet certain specifications. 3. Title: Oscillator Objective: To design a Wien-bridge oscillator using an IC amplifier. 4. Title: Power Control Devices Objective: To study the application of power control devices in a small system.

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures, supplemented with interactive questions and answers, and short quizzes	1,2,3,5	In lectures, students are introduced to the *knowledge* of the subject. *Comprehension* is strengthened with interactive Q&A and short quizzes. They will be able to *define* and *describe* terms of the subject. They will also be able to *explain* and *generalize* complex structure of knowledge
Tutorials are conducted, and problems are given to students for them to solve	2,3,4,5,6	In tutorials, students *apply* what they have learnt in analyzing and solving the problems given by the tutor. They will *analyze* the given information, *compare* and *contrast* different scenarios and propose solutions or alternatives.
Laboratory exercises require hands-on tasks in different topics. After the laboratory, students are required to submit a report reflecting on what they have learnt and the experience and knowledge they have derived.	1,2,3,4,7	Students perform hands-on tasks in laboratory exercises to either strengthen what they have learnt or explore new frontiers. They will be able to *synthesize* a structure of knowledge by designing and planning the tasks, and *relate* the observation to theories and principles. They will also *evaluate* outcomes of the tasks they perform and *interpret* the data they gather
Assignments, homework, and selected end-of-chapter problems	2,3,4,5,6	Through working assignments, homework, and selected end-of-chapter problems in text books, students can develop a firm understanding and *comprehension* of the *knowledge* taught. They will *analyze* given information and *apply* knowledge in solving problem. For some design type of questions, they will have to *synthesize* solutions by *evaluating* different alternatives.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)						
		1	2	3	4	5	6	7
1. Continuous Assessment	40%							
• Tutorials, assignments, and homework			✓	✓	✓	✓	✓	
• Laboratory exercises and reports		✓	✓	✓	✓			✓
• Mid-semester test		✓	✓	✓	✓	✓	✓	
• End-of-semester test		✓	✓	✓	✓	✓	✓	
2. Examination	60%	✓	✓	✓	✓	✓	✓	
Total	100 %							

The continuous assessment consists of assignments, lab reports, and tests.

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

Specific Assessment Methods/Tasks	Remark
Tutorials, assignments, and homework	Tutorials, assignments and homework are given to students to assess their competence level of *knowledge* and *comprehension*, ability to *analyze* given information, ability to *apply* knowledge and skills in new situation, ability to *synthesize* structure, and ability to evaluate given data to make judgment. The criteria and level of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before the work is given. Feedback about their performance will be given promptly to students to help them improve their learning.
Laboratory exercises and reports	Students will be required to perform laboratory exercises and write laboratory reports. The emphasis is on assessing their ability to *apply*, *synthesize* and ev*aluate*. Expectation and grading criteria will be given as in the case of tutorials, assignments and homework.
Mid-semester test	A mid-semester test is set to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of tutorials, assignments and homework.
End-of-semester test and Examination	An end-of-semester test and examination are set to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of tutorials, assignments and homework.

Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lectures	28 Hours
	• Tutorials	14 Hours
	• Laboratory	12 Hours
	Other student study effort:	
	• Lectures	20 Hours
	• Tutorials	14 Hours
	• Laboratory	12 Hours
	Total student study effort:	100 Hours
Reading List and References	**Textbooks:** 1. R. Boylestad and L. Nashelsky, *Electronic Devices and Circuit Theory,* 9th ed., Englewood Cliffs: Prentice-Hall, 2006. **Reference Books:** 1. Bogart, Jr., Beasley and Rico, *Electronic Devices and Circuits*, 6th ed., Prentice-Hall International, 2004. 2. T. Robert Paynter, *Introductory Electronic Devices and Circuits*, 6th ed., Prentice-Hall International, 2002. 3. R.W. Goody, *PSPICE for Windows - A Circuit Simulation Primer*, 2nd ed., Prentice-Hall 1997.	

Subject Description Form

Subject Code	EIE258
Subject Title	Electronic Design Practice
Credit Value	2
Level	2
Pre-requisite	Electronic Circuits I (EIE251)
Co-requisite/ Exclusion	Nil
Objectives	This subject aims to introduce the basic knowledge and skills related to the use of equipment and electronic instruments, and to provide design and fault-finding experience through mini-projects.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the principles of basic electronic instruments. 2. Understand the practical aspects of electronic circuit applications. 3. Use equipment and basic electronic instruments. 4. Perform design and fault-finding of simple electronic circuits/sub-systems. Category B: Attributes for all-roundedness 5. Present ideas and findings effectively. 6. Think critically. 7. Learn independently. 8. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome by requiring students to demonstrate their understanding of circuit theories, abilities in use of basic electronic measuring devices, and applying knowledge to build a new electronic circuit. • Programme Outcome 2: This subject contributes to the programme outcome through use of modern electronic simulation tools for design and building of a mini-project. Category B: Attributes for all-roundedness • Programme Outcomes 7: This subject contributes to the programme outcome by providing opportunity for students to practise their report writing skill. • Programme Outcome 10: This subject contributes to the programme outcome through hands on training in a team environment and collaboration with teammates.

Subject Synopsis/ Indicative Syllabus

Syllabus:

1. Use of Equipment and Basic Instrumentation
   - 1.1 Demonstration and practice on power output meter, frequency counter, CRO, power supply, soldering tools.
   - 1.2 Oscilloscope: operating principles of CRT, time-base and trigger modules; basic concept of digital storage oscilloscope.
   - 1.3 Counter Timer: operating principles of universal counter timer.
   - 1.4 Digital Multimeter: operating principles of ohm converter, ac-dc converter, A/D converter.

2. Mini-Projects
   - 2.1 Title: Applications of Operational Amplifiers
     Objective: To understand the design and the performance of the various applications of general purpose operational amplifiers and analogue switche. These applications include:
     Differential Amplifiers, Instrumentation Amplifiers, Voltage Subtractions/Addition Amplifiers, Differentiator, Integrator, High Gain Inverting Amplifier, Noninverting Summing Amplifier, Compensation of Non-ideal Op-amp Effects, etc.
   - 2.2 Title: Active Filter Circuits
     Objective: To understand the design problems and limitations of practical circuit when use operational amplifiers for the design of active filters, Butterworth, Chebyshev and Bessel. The high-order filters include:
     Low-Pass Filters, High-Pass Filters and Band-Pass Filters

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Project Assemblies	1, 2, 6, 8	Project Introduction, working principles and requirements will be given to students in the project assemblies. *Comprehension* is strengthened with interactive Q&A. The criteria and level of achievement will be defined.
Circuits simulations.	1, 2, 6, 8	Through project pre-works and circuit simulation using PSpice and other simulation tools, students are expected to be able to develop a firm understanding and *be able to* construct their hardware works.
The major component is the mini-projects that require hands-on tasks in different topics. After the mini-projects, students are required to submit a team report reflecting on what they have learnt and the experience and knowledge they have derived.	1, 2, 3, 4, 5, 8	Students perform hands-on tasks in mini-projects to either strengthen what they have learnt or explore new frontiers. They will be able to *synthesize* a structure of knowledge by designing and planning the tasks, and *relate* the observation to theories and principles. They will also *evaluate* outcomes of the tasks they perform and *interpret* the data they collect. Through mini-projects, they will acquire the skill of using electronic instruments, and fault-finding.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							
		1	2	3	4	5	6	7	8
Continuous Assessment									
• Project Pre-works	20%	✓	✓			✓	✓		✓
• Mini-projects and reports	40%				✓	✓			✓
• Test plan and Project Demonstration	40%	✓	✓	✓			✓	✓	
Total	100%								

The course work consists of assignments, mini-project demonstrations and reports.

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

Specific Assessment Methods/Tasks	Remark
Project Pre-works	Students are required to conduct their project pre-works by using simulation tools for their design works. They are expected to work in a team of 2 students.
Mini-projects and reports	Students will be required to perform mini-projects and write reports. The emphasis is on assessing their ability to *apply theories*, build hardware framework, trouble-shooting, fault finding.
Test plan and Project Demonstration	A test plan is required for each mini-project. Each group has to set up a test plan for their projects during the Demonstration phase. It can help to evaluate students' achievement of the learning outcomes and give feedback to them for prompt improvement.

Student Study Effort Expected

Class contact (time-tabled):	
• Project Assembly	9 Hours
• Laboratory	36 Hours
Other student study effort:	
• Project Assembly	3 Hours
• Laboratory	18 Hours
Total student study effort:	66 Hours

Reading List and References	**Textbooks/ Reference Books:** 1. A. R. Hambley, *Electrical Engineering: Principles and Applications*, 4th ed, Prentice-Hall, 2008. 2. R.L. Boylestad and L. Nashelsky, *Electronic Devices and Circuit Theory,* 10th ed., Prentice-Hall, 2009. 3. J.G. Tront, *PSpice for Basic Microelectronics*, McGraw-Hill International ed., 2008.

Subject Description Form

Subject Code	EIE261
Subject Title	Logic Design
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with a broad view in digital logic design and enable them to gain understanding and skills that will be used in later computer-related courses.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of digital systems and associated technologies. 2. Analyse and design simple systems related to digital logic. 3. Apply logic design techniques to construct digital systems with programmable logic devices and microprocessors, and appreciate the use of them. 4. Appreciate the importance of creativity and critical thinking on finding "good" solutions or making "good" designs. Category B: Attributes for all-roundedness 5. Think critically.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of logic circuits and providing the students with an opportunity to practice the application of knowledge. • Programme Outcome 2: This subject contributes to the programme outcome by providing students with an opportunity to conduct experiments using simulation tools. • Programme Outcome 4: This subject contributes to the programme outcome by providing students with an opportunity to apply modern development tools for virtual prototyping. Category B: Attributes for all-roundedness • Programme Outcome 8: This subject contributes to the programme outcome by providing students with an opportunity to think critically and creatively in conducting experiments.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Logic Circuit and ICs 1.1 Decoders and encoders 1.2 Multiplexers and demultiplexers 1.3 Binary adders, binary adder-subtractors 1.4 Binary multipliers 1.5 Sequential circuit analysis and design 1.6 Registers and counters 1.7 HDL representation. 2. Memory and Programmable Logic Devices 2.1 RAM: Write and read operations, timing waveforms, RAM integrated

circuits, three-state buffers, DRAM ICs
2.2 Programmable logic technologies
2.3 ROM, PLA and PAL
2.4 VLSI programmable logic devices: Xilinx FPGA.

3. Microprocessor
3.1 Register transfer operations
3.2 Microoperations
3.3 Bus-based transfer
3.4 ALU
3.5 Shifter
3.6 Datapath representation
3.7 Control word
3.8 Control unit
3.9 Hardwired control
3.10 Basic Assembly Language Programming.

Laboratory Experiment:

1. Basic logic gates and their applications
2. Hardware description language and programmable logic devices

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3, 4	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1, 2, 3, 4, 5	Supplementary to lectures and are conducted with smaller class size. Students will be able to clarify concepts and to have a deeper understanding of the lecture materials. Problems and application examples are given and discussed.
Laboratory sessions	1, 2, 3, 4, 5	students will make use of the software and hardware tools to develop simple digital systems, perform simulations

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
		1	2	3	4	5
1. Continuous Assessment	40%					
• Assignments		✓	✓	✓	✓	✓
• Tests		✓	✓	✓	✓	
• Laboratory sessions		✓	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓	✓
Total	100%					

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

Specific Assessment Methods/Tasks	Remark
Assignments	Enhance the understanding of the taught materials in the lectures.
Tests and examination	End-of chapter type problems are used frequently to evaluate students' ability in applying concepts and skills learned in class. The students are also needed to think critically and creatively in the process of solving problems.
Laboratory sessions	Each student is required to do a demonstration and submit a lab report after the laboratory.

Student Study Effort Expected

Class contact (time-tabled):	
• Lectures	28 Hours
• Tutorials	14 Hours
• Laboratory	16 Hours
Other student study effort:	
• Lectures	28 Hours
• Tutorials	7 Hours
• Laboratory	7 Hours
Total student study effort:	100 Hours

Reading List and References

Textbooks:

1. M.M. Mano and C.R. Kime, *Logic and Computer Design Fundamentals*, 4th ed., Upper Saddle River, NJ: Prentice-Hall, 2008.

Reference Books:

1. M.M. Mano and M.D. Ciletti, *Digital Design.* Upper Saddle River, NJ: Prentice-Hall, 2007.
2. S. Yalamanchili, *VHDL – A Starter's Guide*, 2nd ed. Prentice-Hall, 2005.
3. E.O. Hwang, *Digital Logic and Microprocessor Design With VHDL*, 1st ed., CL-Engineering, 2006.

Subject Description Form

Subject Code	EIE264
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the fundamental concepts of computer programming. 2. To equip students with sound skills in C/C++ programming language. 3. To equip students with techniques for developing structured computer programs. 4. To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Familiarize with at least one C/C++ programming environment. 2. Be proficient in using the basic constructs of C/C++, such as variables and expressions, looping, arrays and pointers, to develop a computer program. 3. 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. Able to apply the computer programming techniques to solve practical engineering problems. Category B: Attributes for all-roundedness 6. Solve problems by using systematic approaches. 7. Write technical reports and present the findings. 8. Learn team working skills.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of computer programming and providing the students with an opportunity to practice the programming techniques to solve practical engineering problems. • Programme Outcome 6: This subject contributes to the programme outcome through providing the students with an opportunity to apply computer programming techniques to solve practical engineering problems. Category B: Attributes for all-roundedness • Programme Outcome 10: This subject contributes to the programme outcome through providing the students with an opportunity to work on the mini-project in a team and collaborate effectively with others.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to programming Software components of a computer – Operating system, directories, files. Evolution of programming languages. Programming environment – Compiler, linker and loader. Building the first program – Hello World. 2. Bolts and Nuts of C/C++ Preprocessor, program codes, functions, comments. Variables and constants. Expressions and statements. Operators.

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<tr><td></td><td>
3. Program Flow Control
If, else, switch, case. Looping – for, while, do. Functions, parameters passing, return values. Local and global variables. Scope of variables.

4. Program Design and Debugging
Structured program design. Improving program readability. Flow chart. Modular programming – static library. Programming bugs, errors, mistakes and code rot. Exceptions and debugging. Case study: Using Visual C++ debugger.

5. Basic Object Oriented Programming
Objects and classes. Encapsulation. Private versus public. Implementing class methods. Constructors and destructors.

6. Pointer and Array
The stack and free store. Create and delete objects in free store. Pointer arithmetic. Passing function arguments by pointer. Returning values by pointer. Array of Objects. Multidimensional array. Array and pointer. Array of pointers. Pointer of array. Character array – Strings. Command line processing.

7. Stream I/O
Input and Output. Input using cin. Output using cout. File I/O using streams.
8. Using C/C++ in Engineering Applications
Solving numerical problems using C/C++. Developing graphical user interfaces for Engineering applications.
</td></tr>
<tr><td>Teaching/ Learning Methodology</td><td>
<table>
<tr><th>Teaching and Learning Method</th><th>Intended Subject Learning Outcome</th><th>Remarks</th></tr>
<tr><td>Lectures</td><td>1, 2, 3, 4, 5</td><td>Fundamental principles and key concepts of the subject are delivered to the students</td></tr>
<tr><td>Tutorials</td><td>1, 2, 3, 4, 5, 6</td><td>Students will be able to clarify concepts and to have a deeper understanding of the lecture material.
Problems are given to be solved.</td></tr>
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Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							
		1	2	3	4	5	6	7	8
Continuous Assessment	100%								
• Tutorial Exercises		✓	✓	✓	✓	✓	✓		
• Assignments		✓	✓	✓	✓	✓	✓	✓	
• Mini-project		✓	✓	✓	✓	✓	✓	✓	✓
• Tests		✓	✓	✓	✓	✓	✓		
Total	100%								

For this subject, students need to go through two 2-hours programming tests in which students will be asked, within the allowed time period, to develop a set of computer programs using C/C++ programming language to solve a problem. These two tests are worth 50% of the total marks.

Besides, students need to finish a mini-project in this subject. Students are expected to spend not less than 35 hours of self-studying in order to finish the mini-project. The mini-project is worth 30% of the total marks.

The remaining 20% of marks are allotted to assignments that will be given during and after the classes.

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

Specific Assessment Methods/Tasks	Remark
Tutorial Exercises	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.
Assignments	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.
Mini-Project	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.
Tests	Evaluate students' ability in applying computer programming skills learned in classes. Problems are given to be solved.

Student Study Effort Expected

Class contact (time-tabled):	
• Lectures	28 Hours
• Tutorials/Laboratory	14 Hours
Other student study effort:	
• Lectures	28 Hours

	• Tutorials/Laboratory	7 Hours
	Total student study effort:	77 Hours
Reading List and References	**Textbooks:** 1. H.M. Deitel and P.J. Deitel, *C++ How To Program*, 5th ed., Prentice-Hall, 2005. **Reference Books:** 1. K. Gregory, *Microsoft® Visual C++® .NET 2003 Kick Start*, Sams Publishing, 2003. 2. H.M. Deitel, P.J. Deitel, J.P. Liperi and C.H. Yaeger, *Visual C++.NET How to Program*, Prentice-Hall, 2004.	

Subject Description Form

Subject Code	EIE282
Subject Title	Information Technology
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide the foundation knowledge in computer engineering, computer networking and data processing that is essential to modern information system construction. 2. To appreciate how information technologies may be deployed in solving engineering problems.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Identify different components of a computer system and understand their features. 2. Understand the basic functions of a computer operating system. 3. Understand the basic principles underlining a database system and be able to set up a simple database. 4. Develop simple Web-based database applications. 5. Have the ability to develop simple Web document. 6. Identify different components and technologies used in the Internet and understand their features. Category B: Attributes for all-roundedness 7. Solve problems using systematic approaches. 8. Learn independently and be able to search for the information required.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of fundamentals of computer systems, databases, and computer networking and providing the students with an opportunity to practice the application of knowledge. Category B: Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through in oral and/or written presentations.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to Computer Systems Number systems, representations of digital data. Evolution of computers. Microprocessors – building blocks, basic instruction code, fetch and execute cycles, correspondence between machine code and assembly language code. Other major hardware components: memory and input/output devices. Software components – applications software, utilities and operating systems. Case study of contemporary microprocessor-based computer systems: user interfaces, file management and storage, process management. 2. Introduction to Database Systems and Information Systems Data modelling, relational database concept, structured query language (SQL), database management, Web and database linking, database

application development. Introduction to information systems. System development life cycle.

3. Networking Essentials and the Internet
   Introduction to computer network: LAN and WAN, clients and servers, network topologies. Networking models. Network protocol case studies: Ethernet, TCP/IP. Internet services and Internet programming. IP addressing, sub-netting, routing and address resolution. Network devices – modem, hub, bridge, switch, and router.

Laboratory Experiments:

Possible Practical Works:
1. Using a debugger to explore the programming model of a microprocessor
2. Tracing the execution of a simple assembly language program
3. Installation and use of Linux
4. Database construction and query
5. Web-based database application development
6. Internet programming case studies
7. TCP/IP connectivity

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1,2,3,4,6	fundamental principles and key concepts of the subject are delivered to students
Tutorials	3,4,5,6,7,8	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; students will be given opportunities to present their ideas and solutions to quizzes and small problems; problems and application examples are given and discussed
Laboratory sessions	4,5,7	students will use software (e.g., Proteus and MPLAB) to program and simulate/emulate a microcontroller (e.g., PIC); students will exam and test a real-life network setup (IP address, network mask) and configure and test a web server (e.g. Apache); students will explain orally to tutors about their findings

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							
		1	2	3	4	5	6	7	8
1. Continuous Assessment (total 40%)									
• Short quizzes	5%	✓	✓	✓					
• 3 Assignments	10%	✓	✓	✓	✓	✓	✓	✓	✓
• 2 Tests	15%	✓	✓	✓	✓	✓	✓	✓	
• 3 Laboratory sessions	10%	✓	✓	✓	✓	✓	✓	✓	
2. Examination	60%	✓	✓	✓	✓	✓	✓	✓	
Total	100%								

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

Specific Assessment Methods/Tasks	Remark
Short quizzes	Objective tests (e.g., multiple-choice questions, true-false, and matching items) conducted to measure the students' ability to remember facts and figures as well as their comprehension of subject materials
Assignments, tests and examination	End-of chapter type problems used to evaluate students' understanding of concepts and skills learnt in the classroom assignments enable students to practice to solve small problems related to computer architect concepts, networking, and databases
Laboratory sessions	Each student is required to produce a written report; Accuracy and the presentation of the report will be assessed; Short questions based on laboratory exercises will be conducted to evaluate students technical knowledge and communication skills

Student Study Effort Expected

Class contact (time-tabled):	
• Lectures	28 Hours
• Tutorials	14 Hours
• Laboratory	9 Hours
Other student study effort:	
• Lectures: review of materials, further reading, assignments, preparation for tests, exams	35 Hours
• Tutorials: pre-view and post-view of materials	7 Hours
• Laboratory: pre-lab reading and one written report	7 Hours
Total student study effort:	100 Hours

Reading List and References	**Reference Books:** 1. A. Evans, K. Martin and M. A. Poatsy, *Technology in Action*, 6th ed., Prentice-Hall, 2010. 2. R. White, *How Computers Work*, 9th ed., Que Pub., 2008. 3. S.M. Sarwar, R. Koretsky, and S.A. Sarwar, *Linux: the Textbook*, Addison-Wesley, 2001. 4. D. Kroenke, *Database Processing: Fundamentals, Design, and Implementation*, 10th ed., Prentice-Hall, 2006. 5. H.M. Deitel, P.J. Deitel and A. B. Goldberg, *Internet and World Wide Web: How to Program*, 3rd ed., Prentice-Hall, 2004. 6. Microsoft, *MCSE Training Kit: Networking Essentials Plus*, 3rd ed., Microsoft Press, 2000. 7. H.L. Capron and J.A. Johnson, *Computers: Tools for an Information Age*, 8th ed., Prentice-Hall, 2004.

Subject Description Form

Subject Code	IC292
Subject Title	Industrial Centre Training
Credit Value	10 training credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objective of this subject is to equip students with the best practical training that is fundamental and essential for their study and professional practice in electronic and information engineering (EIE).
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. 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; 2. apply scientific computing software for computing in science and engineering including visualization and programming; 3. 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; 4. explain basic occupational health and industrial safety requirements for engineering practice; 5. design and fabricate simple electronic equipment prototype for demonstration, development and experimentation purposes; 6. specify and explain contemporary pragmatic manufacturing processes, interconnects and assembly methods for electronic equipment fabrication; 7. prescribe and perform parametric test and analysis and the troubleshooting of simple electronic circuits with the application of basic and virtual electronic instruments; 8. design and verify simple electronic equipment with embedded system; 9. design and create commercial grade, Web based information system for information sharing, business control and logistics; 10. recognize training forms an important part for a professional engineer career and the needs for multi-disciplinary training and continue professional development in professional engineering practice.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** <u>Category A: Professional/academic knowledge and skills</u> • Programme Outcomes 1, 4, 5: This subject contributes to the programme outcome through practical training on professional practice in the design, development, fabrication, test and troubleshooting of electronic equipment and products under an industrial training environment. • Programme Outcome 2: This subject contributes to the programme outcome through teaching, training and project work with engineering tools such as CAD, EDA and instrumentation software. • Programme Outcome 3: This subject contributes to the programme outcome through training and practise in scientific computing software. • Programme Outcome 6: This subject contributes to the programme outcome through the application of business software, scientific computing software, programmable logic controller application and micro-controller

	application. Category B: Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through group work, project discussion, report and presentation on Web. • Programme Outcomes 8, 10, 12: This subject contributes to the programme outcome through practical training in student groups. Students should be able to practise and demonstrate their team work and collaboration skill, leadership potential, critical thinking ability and creativity through working with each other in projects that are encountered in practical training. • Programme Outcome 9: This subject contributes to the programme outcome through induction and practical training that could bring up the awareness and cognition in self-learning and life-long learning as demand for a professional career. • Programme Outcome 11: This subject contributes to the programme outcome through induction on the importance of training, responsibility and ethics for a professional in science and engineering.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1 Engineering Drawing & CAD (TM0805 - 48 hours) 1.1 Mechanical & Electrical Drawing, 2D & 3D CAD (39 hours) 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 modelling including extruding, revolving, sweeping, and lofting; parametric feature based solid modelling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modelling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, surface finishing, and part list. 1.2 Electrical Drawing (3 hours) Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical & 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 (6 hours) Introduction to electronic design automation software; circuit schematics capture and representation; placement of components, capturing, annotation, labelling, net list. Electronic parts library, symbols, decals, physical packages, discrete components, integrated circuits, logic and analogue circuits, electronic parts creation and application. 2 Basic Scientific Computing (TM3012 - 27 hours) 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 & debugging; scripts, functions, logic operations, flow control and graphic user interfaces.

	3 Basic Mechatronic Practice (TM0510 - 30 hours) 3.1 Definitions of mechatronics; design and operation of typical mechatronic systems (such as: car park system); appreciation of measurement system, actuator system, motor drives, mechanical drives, 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 Industrial Safety (TM2009 - 15 hours) 4.1 Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures. 4.2 Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 4.3 Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling. 4.4 Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment. 5 Basic Electronic Practice for EIE (TM1101 – 30 hours) 5.1 Introduction to common electronics parts, use of basic test instruments, best practices and basic troubleshooting techniques, electronics workshop safety. 5.2 Soldering and de-soldering techniques, mounting and installation of electronic circuits, wiring of subassemblies. 5.3 PCB design, hands on practice on PCB circuit design in EDA. 5.4 Circuit artwork, etching process, PCB prototype fabrication. 5.5 Application and use of electronic test instruments: current and voltage measurements, two wire and four wire techniques, power and signal sources, oscilloscope probes, analogue and digital oscilloscopes. 5.6 Introduction to Virtual Instrument, application and hands-on practice on Labview or an equivalent software package. 6 Advanced Electronic Practice for EIE (TM1102 – 30 hours) 6.1 Introduction to electronic circuit interconnect technologies: SMT, COB and wave-soldering. 6.2 Introduction to electronic assembly design and manufacturing process, components, tools and machines. 6.3 Hands-on practice on wave-soldering, SMT process, chip level wire bonding, chip-on-board encapsulation, LCD display attachment with heat seal connector. 6.4 Introduction to advanced electronic packaging and assembly process: fine-pitch SMT, BGA, Flip-chip and CSP. 6.5 Soldering quality of BGA assembly and X-ray inspection machine. 7 Integrated Project (TM1107 – 60 hours) 7.1 Integrated Project provides an opportunity for higher diploma students to develop skills in handling prototype electronic and information engineering projects. 7.2 Students will participate in a team to realize and develop electronic product prototype under an EDA environment. Tasks included electronic circuit development, PCB design and assembly, prototype chassis fabrication, troubleshooting, testing, project web presentation and documentation. 7.3 Besides polishing students' personal quality in teamwork under simulated industrial environment, the projects are structured such that student can top up their training and coalesce their knowledge with experience.

	8 Microcomputer Application and Practice (TM1110 –30 hours) 8.1 Introduction to Microchip Microcomputer families and development tools. 8.2 Hands-on practice on memory, I/O, data communications, ADC operations. 8.3 Hands-on practice on LED and LCD displays. 8.4 Hands-on practice on motor control and sensors. 8.5 Application of Microcomputer on consumer electronic products, mechatronics, home automation products, wired and wireless connectivity. 9 Business Software Applications for EIE (TM1111 – 30 hours) 9.1 Application and practice of Microsoft relational database on Web. Data binding and database creation, indexing, input and output operations. 9.2 Introduction to business computing and logistics; workflow, electronic forms, information acquisition and dissemination on Web. 9.3 XML-based web form development forms and form server using InfoPath & SharePoint. 9.4 Hands-on introduction to Microsoft Office Server for business operation, Sharepoint Designer and applications.
Teaching/ Learning Methodology	The teaching and learning methodology included instructor guided practice, demonstration and projects. Students will be exposed to industrial grade training facilities and workshop environment for pragmatic work in different engineering disciplines. Different training activities are arranged for individual module. Training activities are designed with project centred learning or problem based learning approach so as to motivate learning and enable critical thinking.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)									
		1	2	3	4	5	6	7	8	9	10
Continuous Assessment											
• Assignment / Project	30%	✓	✓	✓	✓	✓	✓	✓	✓	✓	
• Tests	30%	✓	✓	✓	✓	✓	✓	✓	✓	✓	
• Others (Reports & Logbook)	40%		✓	✓	✓	✓	✓	✓	✓	✓	✓
Total	100%										

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

Specific Assessment Methods/ Task	Remarks
Assignment / Project	The projects are designed to facilitate students to reflect and apply the knowledge periodically throughout the training.
Tests	Tests are designed to facilitate students to review the breadth and depth of their understanding on specific topics.
Others (Reports & Logbook)	Report writing is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture/Tutorial	54 Hours
• Workshop	246 Hours
Other student study effort:	
• Workshop	18 Hours
• Report / Logbook	20 Hours
Total student study effort:	338 Hours

Reading List and References

Software List:

1. AutoCAD from Autodesk Inc.
2. SolidWorks from Dassault Systèmes Solidworks Corp.
3. MATLAB from The Mathworks Inc.
4. PADS from Mentor Graphics Inc.
5. LabVIEW from National Instrument
6. MPLAB from Microchip Corp.

Reference Standards:

1. BS8888 Technical Product Specification (TPS) Specification
2. IEEE Std 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams

	3. IEC 61082 Preparation of Documents used in Electrotechnology 4. Code of Practice for the Electricity (wiring) Regulations, EMSD, The Government of the HKSAR. 5. IPC-D-279-1996, Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies, IPC. 6. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. 7. IPC-A-610E-2010, Acceptability of Electronic Assemblies, IPC.. **Reference Books:** 1. H. Moore, *MATLAB for Engineers*, 2nd ed., Prentice-Hall/Pearson, 2009. 2. R.S. Villanucci, A.W. Avtgis, W.F.Megow, *Electronic Technques: Shop Practices and Construction*, 6th ed., Practice-Hall, 1999.

Subject Description Form

Subject Code	COMP350
Subject Title	Computer Graphics
Credit Value	3
Level	3
Pre-requisite	Computer Programming (EIE264)
Co-requisite/ Exclusion	Nil
Objectives	**This subject allows students to:** 1. understand the concept and practice of computer graphics; 2. appreciate the role of graphics as foundations to user interfaces, visualization and digital design; 3. learn the fundamental techniques, data structures and algorithms used in standard graphics API's; 4. learn about the common API's, for example, Java 3D, OpenGL, DirectX.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. identify and integrate digital hardware components required for high-performance computer graphics; 2. develop programs using Java 3D, OpenGL and/or DirectX APIs; 3. understand the problems and apply the techniques in image synthesis; 4. effectively construct data structures and develop algorithms for handling 3D modelling and animation; 5. develop simple graphics software systems. Category B: Attribute for all-roundedness 6. understand, appreciate and follow the development and advancement of computer graphics technologies, including advanced technologies for 3D modelling, high performance rendering.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcomes 6 and 8: This subject contributes to the programme outcomes through graphics program development with careful design and implementation via programming exercises and laboratories. Category B Attributes for all-roundedness • Programme Outcomes 6 and 8: This subject contributes to the programme outcomes through graphics program development with careful design and implementation via programming exercises and laboratories. • Programme Outcomes 7 and 10: This subject contributes to the programme outcomes with group project development and associated report writing.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Hardware components (3 hours) Basic hardware modules necessary for a functional graphics workstation, such as display devices, colour formation, frame buffers and image representation in hardware. 2. Rasterization and scan conversion (4 hours) Algorithms for digitizing basic 2D shapes, such as lines, curves, circles,

	polygons. 3. 2D transformations(3 hours) Transforming points, lines, and vectors in 2D; introduction to homogeneous transformations. 4. 3D modelling and projective spaces (4 hours) 3D modelling: rotations, translations, scaling, shearing, and projective geometry. 5. Camera model (3 hours) Constructing the 3D viewing frustrum; modelling a pin-hole camera for digital image synthesis. 6. Basic 3D object modelling (4 hours) Object hierarchies; planes; polygon meshes; spline curves and surfaces. 7. 3D Visibility (4 hours) Visibility problems and solutions; the Z-Buffer algorithm. 8. Rendering (3 hours) Light, colour, illumination models; shading; ray-tracing; radiosity. **Laboratory Experiment:** Appropriate laboratory exercises will be conducted using the currently available computer graphics API such as OpenGL and DirectX. **Case Study:** If applicable, case studies may be conducted on modelling and design systems that are used in commercial applications.
Teaching/ Learning Methodology	Lectures will provide the basic concepts, theories and models of computer graphics. Laboratory will provide the training in using the programming tools, such as Java 3D, OpenGL and/or DirectX APIs to understand, realize and implement the concepts, theories and models learnt in the lectures. Case studies will be given and discussed in tutorials wherever it is appropriate. Assessments including assignments and project are given to students for reinforcing, practising and applying the basic concepts, theories and models of computer graphics. Project is required to work in groups, which also helps students to develop team work in solving problems. Quiz is given to evaluate students' individual understanding of the subject.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
		1	2	3	4	5	6
Continuous Assessment							
• Assignments	40%	✓	✓	✓	✓		✓
• Quiz(zes)	20%	✓		✓	✓		✓
• Project	40%	✓	✓	✓	✓	✓	✓
Total	100%						

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

This subject is assessed through continuous assessment: assignments, quiz(zes) and project.

The assignments will assess the understanding and use of proper hardware and software (data structures and algorithms) for computer graphics design and applications.

The project will assess in more depth to those assessed in the assignments and, in addition, those components in computer graphics system development have been evaluated. Team work in achieving the project goals is also evaluated.

The Quiz(zes) will assess the individuals' understanding of the subject.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial/Laboratory	14 Hours
Other student study effort:	
• Self-study	20 Hours
• Assignments	10 Hours
• Project	30 Hours
Total student study effort:	102 Hours

Reading List and References

Textbook:

1. D. Hearn and P.M. Baker, *Computer Graphics with OpenGL*, 3rd ed., Prentice-Hall, 2004.

Reference Books:

1. E.S. Angel, Interactive Computer Graphics, *A top-down approach with OpenGL*, 5th ed., Addison-Wesley, 2009.
2. F.S. Hill, Jr. and Stephen M. Kelley, Jr., *Computer Graphics: using OpenGL*, 3rd ed., Prentice-Hall, 2007.
3. D. Shreiner and The Khronos OpenGL ARB Working Group, *OpenGL programming guide: the official guide to learning OpenGL*, versions 3.0 and 3.1, Addison-Wesley, 2010.
4. D. Shreiner et. al., *OpenGL programming guide: the official guide to learning OpenGL*, versions 2.1, Addison-Wesley, 2008.

Subject Description Form

Subject Code	EIE350
Subject Title	Higher Diploma Project
Credit Value	6
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The Higher-Diploma project is intended as a focal point, where students are expected to integrate knowledge from various subject areas to accomplish a task with a given specification. The task may be the design of a product, the characterization of a process, or the investigation of an engineering problem. Other factors encountered in real engineering, e.g., costing, scheduling should be taken into consideration when carrying out the project if appropriate. The student will work in group projects with two students in each group, but each student will be assigned different tasks to be accomplished. Group projects have the advantage of allowing a student to learn to interact with other people to simulate a real working environment.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand, take up, and master the basic knowledge and skills related to the specific project. 2. Integrate and apply knowledge learnt in present and previous stages (vertical integration) and across different subjects (horizontal integration). 3. Apply various professional skills in electronic and information engineering to achieve the objectives of the project. 4. Learn to use new tools and facilities, and to gather new information, for the conduction of the project. Category B: Attributes for all-roundedness 5. Work under the guidance of a supervisor while exercising self-discipline to manage the project. 6. Communicate effectively with related parties (supervisor, peers, vendors). 7. Work with others (team partners, outsource company, technical support staff) collaboratively and develop leadership capability. 8. Realize different constraints, and to make appropriate compromise, when designing a solution to an engineering problem. 9. Disseminate effectively the results and knowledge learnt in the project. 10. Transfer the knowledge and skills learnt in the project.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcomes 1, 2, 3, 4, and 5: In working through the final-year project, the students will learn how to apply knowledge of mathematics and scientific principles in designing engineering solutions to problems with an understanding of professional and social responsibilities. • Programme Outcome 6: In the final-year project, the student will learn how to make use of appropriate computer programming tools with an understanding of their processes and limitations in the course of the conducting the project. Category B Attributes for all-roundedness • Programme Outcome 7: In the final-year project, the students will learn how to conduct effective written or verbal communication with various

	parties. They will use different media such as texts, mathematics, graphics, images, video, animation…etc. They will learn how to use different communication tools such as log book, project proposal, final-year project report, presentation, and demonstration to communicate their ideas, the project design, the underlying theory, and the project results to various audiences in the suitable context. • Programme Outcome 8: The students will be given the chance to exercise creativity and innovation by designing something new (a new software, a new hardware, a new process, a new method) to solve a given problem as required by the project. • Programme Outcome 9: In this subject, the students will learn how to gather information about the background or frontier of their projects and related subject matters by reading and information gathering, and will recognize the need for life-long learning. • Programme Outcome 11: In working through the final-year project, the students will learn how to solve problems in electronic and information engineering with consideration of professionalism and social responsibilities. • Programme Outcome 10 and 12: In the final-year project, the student will learn how to work with others (supervisor, other students. other teaching staff, technicians, vendors, industrialists…etc.) to accomplish the project tasks and to produce the deliverables. S/he will need to communicate/consult people in other disciplines, cooperate with others in the use or acquiring of resources. The students will be given the chance to learn how to exercise leadership when working in a team project or group project that requires collaboration among different students.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** The progression of the project will be guided by a framework, which consists of the following indicative stages. The specific details will vary from project to project. <u>Project Specification</u> In this stage, each group of students will work in conjunction with the project supervisor to draw up a concrete project plan specifying at least the following: 1. Background of the project 2. Aims and objectives 3. Deliverables 4. Methodology to be adopted 5. Schedule <u>Project Execution</u> This is the major part of the project. After the specification is done, the project will be pursued so that the objectives are to be met; the deliverables are to be produced in accordance with the schedule. The students and the project supervisor will meet constantly to discuss the progress. In particular the following should be demonstrated: 1. Adherence to the schedule 2. Achievement of objectives by the student's work 3. Initiatives of the students to work, design, and to solve problems 4. Inquisitiveness of the student (e.g. to probe into different phenomena or to try different approaches) 5. Diligence of the students to spend sufficient effort on the project 6. Systematic documentation of data, design, results, …etc. during the process of working out the project <u>Project Report</u> After the project is finished, it is important that the student can be able to disseminate the results so that the results can be reviewed by others. Through this dissemination process, project achievements can be communicated, experience can be shared, knowledge and skills learnt can

<table>
<tr><td></td><td>be retained and transferred. The following elements will be important:

1. Project log book (documenting the work done over the year)
2. Project report (hardcopy and softcopy)
3. Presentation
4. Performance in a Question-and-Answer session
5. Demonstration</td></tr>
<tr><td>Alignment of Assessment and Intended Subject Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific Assessment Methods/ Task</th><th rowspan="2">% Weighting</th><th colspan="10">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th></tr>
<tr><td>Continuous Assessment</td><td>100%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="10"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
<table>
<tr><th>Specific Assessment Methods/Tasks</th><th>Remark</th></tr>
<tr><td>Continuous assessment</td><td>The assessment of the project work is done continuously throughout the whole project period. The evidence of students' achievement will be documented in log book and the reports submitted in various stages. Each student should be made responsible for a significantly non-overlapping subtask specified by the supervisor. However, each student is expected to understand their partner's work in sufficient depth to answer reasonable technical questions. The student will be required to give a presentation and demonstration so he/she can communicate with other parties about the project achievement. In both the report and in the presentation, students are required to state their individual contributions to the project work and the report. As far as practically possible, the supervisor will assess each student individually and award grades that commensurate with the student's individual contributions.</td></tr>
</table>
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Structured Study</td><td>84 Hours</td></tr>
<tr><td>• Self-work/ Guided Study</td><td>84 Hours</td></tr>
<tr><td>Other student study effort:</td><td>Hours</td></tr>
<tr><td>• Reports</td><td>24 Hours</td></tr>
<tr><td>• Presentation and demonstration</td><td>8 Hours</td></tr>
<tr><td>Total student study effort:</td><td>200 Hours</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>Reference Books:

To be specified by the project supervisor for each project.</td></tr>
</table>

Subject Description Form

Subject Code	EIE351
Subject Title	Analogue and Digital Integrated Circuits
Credit Value	3
Level	3
Pre-requisite	Electronic Circuits I (EIE251) Electronic Circuits II (EIE252) Logic Design (EIE261)
Co-requisite/ Exclusion	Nil
Objectives	To introduce the fundamental principles, techniques, methods, and circuits for analogue and mixed-signal applications.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamental design principles and applications of analogue and digital integrated circuits. 2. Understand the analysis and design techniques of circuits commonly used in operational amplifiers and digital integrated circuits. 3. Understand the design of simple electronic circuits by using commercially available integrated circuits. Category B: Attributes for all-roundedness 4. Present ideas and findings effectively. 5. Think critically. 6. Learn independently. 7. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of integrated analogue and digital circuits. • Programme Outcome 2: This subject contributes to the programme outcome through applying of analytical skills, modern simulation tools for engineering problems solving. Category B Attributes for all-roundedness • Programme Outcome 10: This subject contributes to the programme outcome through works in a team environment and collaboration with teammates. • Programme Outcomes 7 and 12: This subject contributes to the programme outcome through training of students' leadership when working in a team and providing opportunities for students to practise their oral presentation.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Analogue Integrated Circuits 1.1 Analogue basic building blocks: differential pairs, current mirrors, MOS switches, active load, and biasing networks. 1.2 Ideal and practical operational amplifiers. Summing amplifiers. Differentiators and integrators. Design considerations of using non-ideal operational amplifiers. 741 Op Amp circuit. Analogue multipliers.

Logarithmic and anti-logarithmic amplifiers. Analogue-to-digital (A/D) and digital-to-analogue (D/A) converters. Schmitt triggers.

1.3 Stability of feedback amplifiers: Nyquist criterion, lag networks, lag compensation, lead-lag compensation, conditional stability, gain and phase margins using Bode plots.

2. Digital Integrated Circuits

2.1 Structure, operation and design of TTL, MOS, BiCMOS, and ECL logic gates. Input and output characteristics. Practical issues: logic levels, fan-in, fan-out, noise margin, propagation delay and power dissipation. Design of interface circuitry between logic families.

2.2 Typical structure, operation, design and applications of storage elements: flip-flops, registers, and counters. Performance estimation, sources of glitch, clock skew, ringing, causes of malfunctioning and hazards. Semiconductor memories: RAMs, ROMs.

Technical Seminar:

Students are required to give an oral presentation on an assigned topic to their peers after self-learning in a team environment.

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3, 5	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1, 2, 3, 5, 6	Students will be able to clarify concepts and to have a deeper understanding of the lecture material; Problems and application examples are given and discussed.
Technical Seminar	1, 2, 3, 4, 7	Students in groups of 2-3 will conduct a study on an assigned topic and will be required to give an oral presentation to their peers. Q & A session is included.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)						
		1	2	3	4	5	6	7
1. Continuous Assessment (total 40%)								
• Tutorials, Assignments	10%	✓	✓	✓		✓	✓	
• Oral presentation, report writing	20%	✓	✓	✓	✓			✓
• Mid-semester test	10%	✓	✓	✓		✓	✓	
• End-of-semester test	10%	✓	✓	✓		✓	✓	
2. Examination	50%	✓	✓	✓		✓	✓	
Total	100%							

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

Specific Assessment Methods/Tasks	Remark
Tutorials, Assignments	Tutorials, assignments and homework are given to students to assess their competence level of *knowledge* and *comprehension*, ability to *analyze* given information, ability to *apply* knowledge and skills in new situation, ability to *synthesize* structure, and ability to evaluate given data to make judgment.
Oral presentation, Report writing	Students will be required to conduct a team based self-study on an assigned topic. They will give a formal presentation to peers in seminars. Students are expected to learn from their peers through the Q&A sessions. At the end, a written team-report is required to be submitted.
Mid-semester test	A mid-semester test is set to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement.
End-of-semester test and Examination	An end-of-semester test and examination are set to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given in the first lecture.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	10 Hours
• Technical Seminar	12 Hours
Other student study effort:	

	• Lecture	28 Hours
	• Tutorial	10 Hours
	• Technical Seminar	12 Hours
	Total student study effort:	100 Hours
Reading List and References	**Textbook:** 1. D. A. Neamen, Microelectroncis: *Circuit Analysis and Design*, 4th ed., McGraw-Hall, 2009. ISBN: 9780073380643 **Reference Books:** 1. A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, 3rd ed., Saunders College Publishing, 1991. 2. Gray and Meyer, *Analysis and Design of Analog Integrated Circuits*, 4th ed., New York: Wiley, 2001. 3. J.P. Hayes*, Introduction to Digital Logic Design*, Reading: Addison-Wesley, 1993. 4. Wilkinson and Makki, *Digital System Design*, Englewood Cliffs: Prentice-Hall, 1992. 5. J. G. Tront, *PSpice for Basic Microelectronics*, McGraw-Hill International ed., 2008. ISBN: 978-007-126389-4*.*	

Subject Description Form

Subject Code	EIE361
Subject Title	Computer System Fundamentals
Credit Value	3
Level	3
Pre-requisite	Microcontroller Systems and Interface (EIE373)
Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with a broad treatment of the fundamentals of computer systems. Upon completion of the subject, the students should be able to appreciate the typical design concepts adopted in Intel 80x86 microprocessors, memory organization and interfacing, to understand interfacing techniques for the I/O system and the basic concepts of operating systems, and to develop simple assembly language programs.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of computer systems and associated technologies. 2. Solve hardware and software problems related to using small computer systems. 3. Apply interfacing techniques in using computer systems. Category B: Attributes for All-roundedness 4. Communicate effectively. 5. Demonstrate critical and creative thinking. 6. Demonstrate self-learning and life-long learning capability.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through exploring the concepts and design issues of computer systems and through providing the students with an opportunity to apply their knowledge. • Programme Outcomes 4, 5, and 6: This subject contributes to the programmes outcomes through teaching assembly language programming and interfacing design of memory and I/O systems. • Programme Outcomes 1, 4, 5, and 6: This subject contributes to the programme outcomes by providing students with laboratory exercises to analyze DOS file systems, to test interfacing techniques, to write and debug simple assembly language programs. Category B: Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome by providing students with an opportunity to present their ideas and findings effectively in doing their assignments. • Programme Outcome 8: This subject contributes to the programme outcome by providing students with an opportunity to think critically and creatively about the design issues of computer systems and their components. • Programme Outcome 9: This subject contributes to the programme outcome by providing students with the foundations for life-long learning and continual professional development in the areas of computer system fundamentals.

Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to Computing Data formats Internal organization of computers Inside CPUs Brief history of the CPU 2. Computer Arithmetic Floating-point numbers and operations Fast addition Fast multiplication algorithms 3. The 80x86 Microprocessor Brief history of the 80x86 family Inside the 80x86 4. 80x86 Instructions Types of instructions Segments in the 80x86 80x86 addressing modes 5. Processor Control Units Execution of a complete instruction Single-bus and multiple-bus organization Hardwired and microprogrammed control 6. Assembly Programming A sample program Assemble, link, and run a program 7. BIOS and DOS Programming in Assembly INT 10H and INT 21H function calls for character (string) input and display 8. Memory and Memory Interfacing Memory address decoding IBM PC memory map Data integrity in RAM and ROM 16-bit memory interfacing 9. Input/Output and I/O Interfacing Input/output instructions I/O address decoding I/O address map of x86 PCs 8255 PPI chip 10. Interrupts and DMA Basics of interrupts 8088/86 interrupts Direct memory accessing 11. Secondary Storage and File Systems Disk organization: boot record, FAT, and directory File systems 12. PC Bus Architecture Evolution of bus architecture from ISA to PCI and USB Performance of various buses 13. Introduction to Operating Systems Basic input/output system (BIOS) and basic disk operating system (DOS) Multitasking and time-sharing

Laboratory Experiments:

1. 80x86 registers and memory architecture
2. 80x86 programming
3. Assembly language programming
4. BIOS and DOS programming
5. 8255 PPI chip
6. File systems

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1, 2, 3	fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1, 2, 3, 4, 5	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed.
Laboratory sessions	1, 2, 3, 4, 5, 6	students will make use of an x86 assembler and debugger to develop assembly programs and explore basic file systems and OS concepts; and circuit boards to study various I/O interfacing techniques and evaluate their efficiency and performance.
Assignments	1, 2, 3, 4, 5, 6	Through working assignment and end-of-chapter problems in text books, students will develop a firm understanding and comprehension of the knowledge taught.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
		1	2	3	4	5	6
1. Coursework	40%						
• Laboratory sessions		✓	✓	✓		✓	✓
• Assignments		✓	✓	✓	✓	✓	✓
• Tests		✓	✓	✓		✓	✓
2. Examination	60%	✓	✓	✓		✓	✓
Total	100%						

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

Specific Assessment Methods/Tasks	Remark
Assignments, tests and examination	end-of-chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem.
Laboratory sessions	each student is required to produce written reports; accuracy and the presentation of the reports will be assessed.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Laboratory	18 Hours
Other student study effort:	
• Self-learning (review of materials, further reading, preparation for tests and examination)	32 Hours
• Assignments	10 Hours
Total student study effort:	102 Hours

Reading List and References

Recommended Textbook:

1. M.A. Mazidi and J.G. Mazidi, *The 80x86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing*, International Edition, 5th ed., Pearson Education, 2010.

Reference Books:

1. Irv Englander, *The Architecture of Computer Hardware and Systems Software: An Information Technology Approach*, Wiley, 2003.
2. W. Buchanan, *PC Interfacing, Communications and Windows*

	Programming, Addison-Wesley, 1999 3. H-S. Messmer, *The Indispensable PC Hardware Book*, Addison-Wesley, 1997. 4. J. Uffenbeck, *The 80x86 Family: Design, Programming, and Interfacing*, 3rd ed., Prentice-Hall, 2002. 5. *B.B. Bery,* The Intel Microprocessors 8086/8088, 80186/80188, 8086, 80386, 80486, Pentium, Pentium pro processor, Pentium II, Pentium III, Pentium 4 and Core2 with 64-bit extensions: Architecture, Programming, and Interfacing, *8th ed., Pearson Prentice-Hall,* 2009.

Subject Description Form

Subject Code	EIE362
Subject Title	Linear Systems
Credit Value	3
Level	3
Pre-requisite	Mathematics I (AMA203)
Co-requisite/ Exclusion	Nil
Objectives	1. To provide students with basic concepts and techniques for the modelling and analysis of linear continuous-time and discrete-time signals and systems. 2. To provide students with an analytical foundation for further studies in Communication Engineering and Digital Signal Processing.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the concepts, principles and techniques relating to linear systems. 2. Apply knowledge of mathematics and scientific principles to solve engineering problems relating to linear systems. 3. Understand the fundamentals of linear systems in real applications. Category B: Attributes for all-roundedness 4. Communicate effectively. 5. Think critically. 6. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals in linear systems and providing the students with an opportunity to practice the application of knowledge. • Programme Outcome 2: This subject contributes to the programme outcome through providing the students with an opportunity to conduct experiments, analyze, and interpret data Category B Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through presentations and exchange of ideas.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Signal Representation Signal Classification, Continuous and Discrete-Time Signals, Random Signals. Time-Domain and Frequency-Domain Representations. 2. Continuous-Time and Discrete-Time Systems Impulse Representation and Convolution, Linear Time-Invariant Systems. Properties of Systems: Causality, Time Invariance, Linearity, Systems with Memory, Inverse of a System, Stability. LTI Systems: Differential and Difference Equation Representation, Block Diagram Representations.

3. Fourier Representations for Signals
Reviews on Periodic and Nonperiodic Signals, Continuous and Discrete Signal, Fourier Series and Transform, Frequency Spectra. Properties of Fourier Representations, Time Functions, Applications on System Frequency Response and Signal Frequency Spectrum. Frequency Response of LTI Systems, Sampling. Discrete-Time Fourier Transform, Discrete Fourier Transform.

4. Laplace Transform
Definition and Properties of Laplace Transform, Inversion of Laplace Transform, Bilateral Laplace Transform. Transform Analysis of LTI Systems, Poles and Zeros. Relationship of Laplace Transform and Fourier Transform.

5. *z*-Transform
Definition and properties of *z*-Transform. Inverse *z*-Transform: Power Series Expansion, Partial-Fraction Expansion. *z*-Transfer Analysis of LTI Systems, Frequency Response. Mapping between *z*-Plane and *s*-Plane.

6. Analogue Filters
Ideal Filters, Bode Plots. Filter Design: Butterworth Filters, Chebyshev Filters, Frequency Transformations.

Laboratory Experiments:

1. Fundamentals of Signals
2. Linear Time-Invariant Systems
3. Fourier Analysis of Continuous-time Signals
4. Sampling
5. Fourier Analysis of Discrete-time Signals
6. Laplace Transform

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3	In lectures, students are introduced to the knowledge of the subject. Comprehension is strengthened with interactive Q&A and short quizzes. They will be able to define and describe terms about linear systems. They will also be able to explain and generalize complex structure of knowledge (e.g. convolution of LTI systems)
Tutorials	2, 3, 4, 5	In tutorials, students apply what they have learnt in analyzing and solving the problems given by the tutor. They will analyze the given information, compare and contrast different solutions or alternative methods.
Laboratory sessions	2, 3, 4, 5, 6	Students perform hands-on tasks in laboratory exercises to either strengthen what they have learnt or explore new frontiers. They will be able to *synthesize* a structure of knowledge by designing and planning the tasks, and *relate* the observation to theories and principles. They

			will also *evaluate* outcomes of the tasks they perform and *interpret* the data they gather (e.g. the use of different transforms of signals).

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**					
		1	**2**	**3**	**4**	**5**	**6**
1. Coursework	40%						
• Assignments			✓	✓	✓	✓	
• Laboratory sessions			✓	✓	✓	✓	✓
• Short quizzes		✓		✓		✓	
• Test			✓	✓	✓	✓	
2. Examination	60%		✓	✓	✓	✓	
Total	100%						

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

Specific Assessment Methods/Tasks	**Remark**
Short quizzes	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignment/homework.
Assignments, tests and examination	There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. These are mainly comprehensive in nature. Expectation and grading criteria will be given as in the case of assignment/homework.
Laboratory sessions	Each student is required to produce a written report; accuracy and the presentation of the report will be assessed; students' technical knowledge will be assessed.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Laboratory	18 Hours
Other student study effort:	
• Lecture	22 Hours

	• Tutorial	20 Hours
	• Laboratory	18 Hours
	Total student study effort:	120 Hours
Reading List and References	**Reference Books:** 1. M.J. Roberts, Signals and Systems, *Analysis using Transform Methods and Matlab*, McGraw-Hill, 2003. 2. J.H. McCellan, et. al., *Signal Processing First*, Prentice-Hall, 2003. 3. Ed. Kamen and Bonnie Heck, *Fundamentals of Signals and Systems Using the Web and Matlab*, 2/e, Prentice-Hall, 2000. 4. Charles L. Phillips, et al., *Signals, Systems, and Transforms, 3/e*, Prentice-Hall, 2003.	

Subject Description Form

Subject Code	EIE373
Subject Title	Microcontroller Systems and Interface
Credit Value	3
Level	3
Pre-requisite	Logic Design (EIE261)
Co-requisite/ Exclusion	Nil
Objectives	To provide students with the concepts and techniques required in designing computer hardware interfaces and embedded software for microcontrollers.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Use assembly languages in developing programs for the use of microcontrollers. 2. Use the C programming language in developing more complicate program for the use of microcontrollers. 3. Apply basic skills for interfacing common devices to microcontrollers. Category B: Attributes for All-roundedness 4. Present ideas and findings effectively. 5. Think critically and creatively.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of logic circuits and providing the students with an opportunity to practice the application of knowledge. • Programme Outcome 2: This subject contributes to the programme outcome by providing an opportunity to conduct experiments using simulation tools. • Programme Outcome 6: This subject contributes to the programme outcome by providing students with an opportunity to apply modern software tools for virtual prototyping. Category B Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome by providing students with an opportunity to present their individual achievement to the demonstrator after each laboratory assignment. • Programme Outcome 8: This subject contributes to the programme outcome by providing students with an opportunity to think critically and creatively in conducting experiments.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Architecture of Typical Microcontrollers Overview of programming model, instruction set, interface to external memory; use of stack in subroutine calls and interrupt services; access of built-in I/O ports, timers and counters. 2. Software Development Environment Features of a selected macro assembler, working principle of assembler; assembler directives, examples of assembly language programs; features of a selected C compiler, examples of C programs for controlling microcontrollers.

3. I/O Interfacing
   Output-pin driving limitations, current driving, inductive load driving; pulse generation and measurement; keyboard scanning, display multiplexing, LCD controllers, use of peripheral interface IC; analogue signal sensing, analogue and digital conversion; serial interface standards; examples of microcontroller-based industrial I/O standards.

4. Embedded Software Development and Testing
   Embedded software issues; tasks and events; interrupt system: nesting, priority and latencies; simulator, debugger and emulator.

Laboratory Experiments:

Practical Works:
Supervised laboratory sessions:
1. Develop interrupt service routines serving timer interrupts and external interrupts.
2. Embedded software development using MCU development tools.

Mini-project:
Build and test a microcontroller system employing external peripheral interface IC, multiple 7-segment displays, LEDs and small keyboard, etc.

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1,2,3	Fundamental principles and key concepts of the subject are delivered to students
Tutorials	1,2,3	Some exercises and application examples are given for discussion The students will be able to clarify concepts and to have a better understanding of the lecture material
Laboratory sessions	1,2,3,4,5	Students will make use of software and hardware tools to carry out laboratory assignments

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**				
		1	**2**	**3**	**4**	**5**
1. Continuous Assessment	40%					
• Assignments		✓	✓	✓		
• Laboratory sessions		✓	✓	✓	✓	✓
• Tests		✓	✓	✓		
2. Examination	60%	✓	✓	✓		
Total	100%					

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

Specific Assessment Methods/Tasks	**Remark**
Assignments	Enhance the understanding of the taught materials in the lectures

<table>
<tr><td></td><td colspan="2"><table>
<tr><td>Tests and examination</td><td>End-of chapter type problems are used frequently to evaluate students' ability in applying concepts and skills learned in class

The students are also needed to think critically and creatively in the process of solving problems</td></tr>
<tr><td>Laboratory sessions</td><td>Each student is required to illustrated their achievement and produce a detailed work record when presenting his/her demonstrations

Students are also needed to think critically and creatively to accomplish certain laboratory assignments</td></tr>
</table></td></tr>
<tr><td rowspan="9">Student Study Effort Expected</td><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Lecture</td><td>28 Hours</td></tr>
<tr><td>• Tutorial</td><td>14 Hours</td></tr>
<tr><td>• Laboratory</td><td>18 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Lecture</td><td>28 Hours</td></tr>
<tr><td>• Tutorial</td><td>7 Hours</td></tr>
<tr><td>• Laboratory</td><td>9 Hours</td></tr>
<tr><td>Total student study effort:</td><td>104 Hours</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Reference Books:

1. A.V. Deshmukh, Microcontrollers [Theory and Appications], Tata Mcgraw Hill, 2006.
2. M.J. Pont, Embedded C, Addison-Wesley, 2002.
3. S.R. Ball, Debugging Embedded Microprocessor Systems, Butterworth-Heinemann, 1998.
4. M.A. Mazidi and J.G. Mazidi, The 8051 Microcontroller and Embedded Systems, Prentice-Hall, 2000.
5. J. Labrosse, Micro C/OS-II, R & D Books, Miller Freeman, 1999.
6. D.V. Hall, Microprocessors and Interfacing: Programming and Hardware, 2nd ed., McGraw-Hill, 1992.</td></tr>
</table>

Subject Description Form

Subject Code	EIE374
Subject Title	Signal Processing Applications
Credit Value	3
Level	3
Pre-requisite	Linear System (EIE362)
Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with the concepts and design techniques of basic signal processing systems, and familiarizes students with the techniques of using Matlab to understand different signal processing applications.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the concepts, principles and techniques relating to digital systems. 2. Apply knowledge of mathematics and scientific principles to solve engineering problems relating to signal processing. 3. Understand the fundamentals of signal processing in real applications. Category B: Attributes for all-roundedness 4. Communicate effectively. 5. Think critically. 6. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals in signal processing and providing the students with an opportunity to practice the application of knowledge. • Programme Outcome 2: This subject contributes to the programme outcome through providing the students with an opportunity to conduct experiments, analyze, and interpret data Category B Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through presentations and exchange of ideas.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Discrete-time Systems and General Realization Techniques Basic definition of discrete-time signal. The z-transform and inverse z-transform, computation of frequency response, stability. Direct realization, canonic form realization, cascade and parallel realization of digital systems. 2. Design of Infinite Impulse-response (IIR) and Finite Impulse-response (FIR) Digital Filters Types of digital filters: IIR and FIR. IIR filter design, bilinear transformation, frequency scaling, transformation from prototype low-pass filter to high-pass filter and band-pass filter. Impulse-invariant and step-invariant approaches. FIR filter analysis, Fourier series approach, windowing, Gibbs phenomenon, commonly used windows, concept of linear phase, frequency transformation, low-pass, band-pass, high-pass filters and filter band design.

3. Discrete Fourier transform (DFT)
   Fourier analysis using the DFT, convolution theorem, circular convolution, the fast Fourier transform (FFT) algorithm and implementation of the FFT.

4. Signal Processing Applications
   Architectures of digital signal processors and DSP chips. Application examples.

Laboratory Experiments:

1. Digital filter design
2. Encoding and decoding touch-tone signals for telephones
3. Frequency spectrum analyzer
4. Programming a signal processor

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	2, 3, 4, 5	Supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed.
Laboratory sessions	2, 3, 4, 5, 6	Students will make use of MATLAB to simulate various signal processing techniques and evaluate their performance.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**					
		1	**2**	**3**	**4**	**5**	**6**
1. Continuous Assessment	40%						
• Assignments			✓	✓	✓	✓	
• Laboratory sessions			✓	✓	✓	✓	✓
• Short quizzes		✓		✓		✓	
• Tests			✓	✓	✓	✓	
2. Examination	60%		✓	✓	✓	✓	
Total	100%						

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

Specific Assessment Methods/Tasks	**Remark**
Short quizzes	Objective tests conducted to measure students' ability to remember facts and figures as well as

		their comprehension of subject materials.
	Assignments, tests and examination	End-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem.
	Laboratory sessions	Each student is required to produce a written report; accuracy and the presentation of the report will be assessed; students' technical knowledge will be assessed.
Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lecture	28 Hours.
	• Tutorial	14 Hours
	• Laboratory	12 Hours
	Other student study effort:	
	• Lecture: further reading, assignments, preparation for test and exam	33 Hours
	• Tutorial: preview and review of material	7 Hours
	• Laboratory: report writing	6 Hours
	Total student study effort:	100 Hours
Reading List and References	**Reference Books:** 1. E.C. Ifeacher and B.W. Jervis, *Digital Signal Processing - A Practical Approach*, Prentice-Hall, 2002. 2. Ed. Kamen and Bonnie Heck, *Fundamentals of Signals and Systems Using the Web and Matlab*, 2/e, Prentice-Hall, 2000. 3. James H. McClellan, Ronald W. Schafer, and Mark A. Yoder, *Signal Processing First*, Prentice-Hall, 2003.	

Subject Description Form

Subject Code	EIE375
Subject Title	Object-Oriented Design and Programming
Credit Value	3
Level	3
Pre-requisite	Computer Programming (EIE264)
Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with the principles of object orientation from the perspective of Java implementation and UML. Students are expected to learn the concepts of and practical approaches to object-oriented analysis, design and programming using UML and Java.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the principles of object oriented design. 2. Understand and apply the programming language Java in object oriented software development. 3. Understand and apply the tool UML in object oriented software modelling. 4. Develop a simple software application using the object oriented approach. Category B: Attributes for all-roundedness 5. Learn independently and be able to search for the information required in solving problems.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of object-oriented programming and providing the students with an opportunity to practice the programming techniques to solve practical software development. • Programme Outcome 6: This subject contributes to the programme outcome through providing the students with an opportunity to apply object-oriented programming techniques to solve practical engineering problems. Category B Attributes for all-roundedness • Programme Outcome 9: This subject contributes to the programme outcome through providing the students with an opportunity to work on the laboratory exercises to demonstrate self-learning and life-long learning capability.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to Software Engineering Software products; the software process; process models; process visibility. 2. Java Programming Basic Java technologies; Java platform; Java language basic: variables, operators, expressions, statements, blocks, control flow, methods, arrays

3. Object-Oriented Programming with Java
Objects and classes; class definition; fields, constructors and methods; object interaction; grouping objects; array and collections; designing classes; inheritance and polymorphism; managing inheritance: creating subclasses and super-classes, hiding member variables, overriding methods. Interfaces and packages.

4. Web Programming with Java
Java Applets: creating custom applet subclasses, HTML applet tag syntax, passing information from Web pages to applets. Java Servlets: architecture of servlets, client interaction, life cycle of servlets, saving client states; servlet communications, session tracking, and using server resources.

5. Unified Modelling Language (UML)
Purposes of modelling. Structural Modelling: classes, relationships, class Diagrams, interfaces, packages, and object diagrams. Behavioural modelling interactions, use cases, use case diagrams, interaction diagrams, activity diagrams, events, signals, processes and threads. Architectural modelling: components, deployment, collaborations, patterns, frameworks, component diagrams, and deployment diagrams. Mapping UML diagrams to Java Code.

Laboratory Experiments:

1. Laboratory Work
Students will implement an on-line shopping system using Java Servlets and Tomcat Web server. Students will use a UML software tool to write requirement specifications and design documents for the on-line shopping system.

2. Practical Work
Students will be requested to write and debug Java programs during tutorial and lab sessions.

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3, 4	Fundamental principles and key concepts of the subject are delivered to the students.
Tutorials	1, 2, 3, 4, 5	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
		1	2	3	4	5
1. Continuous Assessment (total 40%)						
• Laboratory exercises	8%	✓	✓	✓	✓	✓
• Tutorial exercises	12%	✓	✓	✓	✓	✓
• Tests	20%	✓	✓	✓	✓	
2. Examination	60%	✓	✓	✓	✓	
Total	100%					

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

Specific Assessment Methods/Tasks	Remark
Tutorial Exercises	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.
Laboratory Exercises	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.
Tests and Examination	Students will be able to clarify concepts and to have a deeper understanding of the lecture material. Problems are given to be solved.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Laboratory	9 Hours
Other student study effort:	
• Lecture	28 Hours
• Tutorial	14 Hours
• Laboratory	9 Hours
Total student study effort:	102 Hours

Reading List and References

Textbooks:

1. Y. Daniel Liang, *Introduction to Java Programming: Comprehensive Version*, 8th ed., Pearson, 2010.
2. G. Booch, I. Jacobson and J. Rumbaugh, *The Unified Modeling Language User Guide*, Addison-Wesley, 1999.

	Reference Books: 1. H.M. Deitel and P.J. Deitel, *Java: How To Program*, 5th ed., Prentice-Hall, 2002. 2. R.C. Lee and W.M. Tepfenhart, *Practical Object-Oriented Development with UML and Java*, Prentice-Hall, 2003. 3. J. Rumbaugh, I. Jacobson and G. Booch, *The Unified Modeling Language Reference Manual*, Addison-Wesley, 1999. 4. http://java.sum.com.

Subject Description Form

Subject Code	EIE380
Subject Title	Web-based Multimedia
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject enables students to understand the production and use of multimedia for the World Wide Web (WWW).
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of web-based multimedia and associated technologies. 2. Apply theory to practice by doing laboratory experiments on how to use the tools to create digital audio, image and video, and how multimedia integrates with the WWW. 3. Solve problems and design applications related to web-based multimedia. Category B: Attributes for all-roundedness 4. Communicate effectively. 5. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A Professional/academic knowledge and skills • Programme Outcome 1: This subject contributes to the programme outcome through teaching of the fundamentals of web-based multimedia and providing the students with an opportunity to practice the application of knowledge. • Programme Outcome 6: This subject contributes to the programme outcome through providing the students with an opportunity to use the computer tools – SMIL and VRML to create multimedia applications. Category B Attributes for all-roundedness • Programme Outcome 7: This subject contributes to the programme outcome through presentations and exchange of ideas via multimedia tools. • Programme Outcome 10: This subject contributes to the programme outcome through the group projects to build multimedia presentations.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. System Requirements Internet access. Access information on the WWW. Software and hardware requirements for multimedia. 2. Tools for Multimedia Integration Audio/Video on the WWW. Synchronized Multimedia Integration Language (SMIL) and Virtual Reality Markup Language (VRML). 3. Basics of Multimedia Signals Fundamentals of audio and psychoacoustics. Visual perception and image representation. Digitization of sound and images.

4. Compression Standards
Image compression – JPEG. Video and audio coding – MPEG. Video conference - H.263/264.

5. Media Production
Production tools and concepts. Digital audio, image and video production.

6. Media File Formats
Graphic file formats. Image file formats. Audio file formats. Video file formats.

Laboratory Experiments:

1. Creating a simple multimedia presentation using SMIL.
2. Creating an interactive multimedia presentation using SMIL.
3. Building a simple 3-D scene using VRML.
4. Using Advanced Features of VRML.
5. Creating an Animated VRML World.

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures, supplemented with interactive questions and answers, and short quizzes	1,3	In lectures, students are introduced to the knowledge of the subject, comprehension is strengthened with interactive Q&A and short quizzes. They will be able to understand the fundamental principles and key concepts of web-based multimedia. They will also be able to solve problems and design applications related to web-based multimedia.
Tutorials	1,3,4	In tutorials, students will be able to clarify concepts and to have deeper understanding of the lecture materials through the use of problems and application examples. They will design solutions for web-based multimedia under any particular situation. Problems and applications are given and discussed.
Five laboratory exercises, where students will perform hands-on tasks in different topics	2,3,4	Students perform hands-on tasks in laboratory exercises to either strengthen what they have learnt or explore new frontiers.
Assignment and Homework	1,3,4	Through working assignment and homework problems, students will develop a firm understanding and comprehension of the knowledge taught. They will analyze given information and apply knowledge in solving problem. For some design type of questions, they will have to synthesize solutions by evaluating different alternatives.
Mini-project	2,3,4,5	Students in groups of 2-3 are required to work on small scale production of web-based multimedia.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
		1	2	3	4	5
1. Continuous Assessment (total 40%)						
• Laboratory works with hand-on task	2%		✓	✓	✓	
• Mini-project	10%		✓	✓	✓	✓
• Short quizzes/Assignments	8%	✓	✓	✓	✓	
• Tests	20%	✓	✓	✓	✓	
2. Examination	60%	✓	✓	✓	✓	
Total	100%					

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

Specific Assessment Methods/Tasks	Remark
Short Quizzes/Assignment /Homework	For short quizzes, it is mainly objective tests (e.g., multiple-choice questions, true-false, and matching items) conducted to measure the students' ability to remember facts and figures as well as their comprehension of subject materials. Assignment and Homework are given to students to assess their competence level of knowledge and comprehension, ability to analyze given information, ability to apply knowledge and skills in problem solving and ability to evaluate given data to make judgment.
Laboratory works with hand-on tasks	Students will be required to perform five laboratory works and they need to submit some hand-on tasks. The emphasis is on assessing their ability to apply theory to practice to find optimum solutions for designing web-based multimedia.
Mini-project	Each group of students are required to produce a written report, and accuracy and the presentation of the report will be assessed; an oral examination will be conducted for each group member to evaluate his technical knowledge and communication skills.
Mid-semester test	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement.
End-of-semester test and Examination	There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes.

Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lecture	28 Hours
	• Tutorial	14 Hours
	• Laboratory	9 Hours
	Other student study effort:	
	• Lecture	28 Hours
	• Tutorial	7 Hours
	• Laboratory	14 Hours
	Total student study effort:	100 Hours
Reading List and References	**Reference Books:** 1. F. Halsall, *Multimedia Communications*, Addison-Wesley, 2001. 2. Ralf Steinmetz and Klara Nahrstedt, *Multimedia Fundamentals Volume 1: Media Coding and Content Processing*, Prentice-Hall PTR, 2002 3. R. Brice, *Multimedia and Virtual Reality Engineering*, 1st ed., Newnes, 1997. 4. D.O. Gehris, *Using Multimedia Tools and Applications on the Internet*, 1st ed., ITP, 1998. 5. B. Furht, S.W. Smoliar and H.J. Zhang, *Video and Image Processing in Multimedia Systems*, 1st ed., Kluwer Academic Publishers, 1995.	

Subject Description Form

Subject Code	EIE381
Subject Title	Communication Fundamentals
Credit Value	3
Level	3
Pre-requisite	Mathematics I (AMA203) Mathematics II (AMA204)
Co-requisite/ Exclusion	Nil
Objectives	Telecommunication systems enable the transfer and exchange of information over communication channels that are corrupted by disturbances and noises in a cost-effective manner. The major objectives of this subject are for the students to establish a firm foundation for the understanding of telecommunication systems, and the relationship among various technical and socio-economic factors when such systems are designed and operated.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of signal analysis and communication systems. 2. Apply the fundamentals to solve problems related to communications. 3. Design simple telecommunication systems that consist of basic and essential building blocks. Category B: Attributes for all-roundedness 4. Present ideas and findings effectively. 5. Think critically. 6. Learn independently. 7. Work in a team and collaborate effectively with others.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 1, 3, 4 and 5: In this subject, the students will learn how to apply mathematics, science and engineering knowledge in analyzing the features of, and solving problems for communication systems. They will also learn how the relationship between various conflicting factors (power, bandwidth, signal-to-noise ratio, costs) that when solving problems for communication systems. • Programme Outcomes 2: In this subject, the students will learn how to setup and conduct experiments for the study of communication systems. • Programme Outcome 6: In this subject, the students will learn how to make use of appropriate IT tools to analyze, visualize, and present features about communication systems. Category B: Attributes for all-roundedness • Programme Outcome 7: The students will learn how to communicate effectively in writing by doing homework and assignments, writing laboratory reports, and writing laboratory log books. • Programme Outcome 8: In this subject, the students will be aware of the need of creativity in the process of design basic telecommunication systems.

Subject Synopsis/ Indicative Syllabus

Syllabus:

1. Introduction
   Introduction to communication systems. Elements of a basic communication system. Examples of wired and wireless systems.

2. Fundamental Concepts of Signal and Systems
   Classification of signal and systems, Fourier series, Fourier transform, time-frequency relationships, Parseval's theorem, power spectral density, autocorrelation correlation and cross-correlation function, convolution, sampling theorem, filters in communication systems, energy spectral density.

3. Information Theory
   3.1 Measure of information. Entropy.
   3.2 Channel capacity.

4. Analogue Communications
   4.1 Amplitude modulation: double sideband, single sideband and vestigial side band modulation, frequency spectrum and power relationship of the amplitude modulation signal, demodulation methods.
   4.2 Angular modulation: phase and frequency modulation, frequency spectrum of the angular modulation signals, demodulation methods.
   4.3 Output signal-to-noise ratio in various analogue modulations systems. S/N ratio improvement through pre-emphasis/de-emphasis.

5. Digital Communications
   5.1 Pulse amplitude modulation, quantizing and coding, quantization noise, uniform & non-uniform quantization, pulse code modulation, delta modulation. Comparison of pulse code modulation & delta modulation systems.
   5.2 Time division multiplexing: concept of framing and synchronizations, TDM-PCM telephone system, comparison of TDM & FDM.

Laboratory Experiments:

Experiments
1. Fourier Analysis of a Square Wave
2. Amplitude Modulation (Basic knowledge)
3. Amplitude Modulation (Circuit implementation)
4. Frequency Modulation (Basic knowledge)
5. Frequency Modulation (Circuit implementation)
6. Sampling and Time Division Multiplexing

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures, supplemented with short quizzes.	A(1,2)	In lectures, students are introduced to the *knowledge* of the subject, *comprehension* is strengthened with short quizzes. They will be able to *define* and *describe* terms about signal analysis and communication systems.
Tutorials where case studies are conducted, and problems are given to students for them to solve.	A(1,2) B(3, 5)	In tutorials, students *apply* what they have learnt in analyzing the cases and solving the problems given by the tutor. They will *analyze* the given information, *compare* and *contrast* different scenarios and propose solutions or alternatives.

	Four laboratory exercises, where students will perform hands-on tasks in different topics. After the laboratory, they will have to write a report to reflect on what they have learnt and the experience and knowledge they have derived.	A(1) B(3,4,6)	Students perform hands-on tasks in laboratory exercises to either strengthen what they have learnt or explore new frontiers. They will be able to *synthesize* a structure of knowledge by designing and planning the tasks, and *relate* the observation to theories and principles. They will also *evaluate* outcomes of the tasks they perform and *interpret* the data they gather (e.g. the transmission bandwidth of a wideband FM communication system).
	Assignment and Homework, solving end-of-chapter problems	A(1,2) B(3,4,5)	Through working assignment and homework, and end-of-chapter problems in text books, students will develop a firm understanding and *comprehension* of the *knowledge* taught. They will *analyze* given information and *apply* knowledge in solving problem.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**					
		1	**2**	**3**	**4**	**5**	**6**
1. Continuous Assessment	40%						
• Assignments/ Homework		✓	✓	✓	✓	✓	
• Laboratory works and reports		✓	✓	✓	✓		✓
• Mid-semester test		✓	✓	✓	✓		
• End-of-semester test		✓	✓	✓	✓		
2. Examination	60%	✓	✓	✓	✓		
Total	100%						

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

Specific Assessment Methods/Tasks	**Remark**
Assignment/Homework	Assignment/Homework and case study reports are given to students to assess their competence level of *knowledge* and *comprehension*, ability to *analyze* given information, ability to *apply* knowledge and skills in new situation, ability to *synthesize* structure, and ability to evaluate given data to make judgment. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment/homework is given. Feedback about their performance will be given promptly to students to help them

		improvement their learning.
	Laboratory works and reports	Students will be required to perform four laboratory works and write four group laboratory logbook and one individual laboratory report. The emphasis is on assessing their ability to *apply*, *synthesize* and ev*aluate*. Expectation and grading criteria will be given as in the case of assignment/homework.
	Mid-semester test	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignment/homework.
	End-of-semester test and Examination	There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. Expectation and grading criteria will be given as in the case of assignment/homework.

Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lecture	28 Hours
	• Tutorial	14 Hours
	• Laboratory	18 Hours
	Other student study effort:	
	• Lecture	22 Hours
	• Tutorial	20 Hours
	• Laboratory	18 Hours
	Total student study effort:	120 Hours

Reading List and References

Textbook:

1. J.G. Proakis and M. Salehi, *Communication Systems Engineering*, 2nd ed., Prentice-Hall, 2002.

Reference Books:

1. T.G. Thomas and S. Sekhar, *Communication Theory*, McGraw-Hill, 2006.
2. S. S. Haykin, *Communication Systems*, 4th ed., Wiley, 2001.
3. A.B. Carlson, P.B. Crilly and J.C. Ruthledge, *Communication Systems*, 4th ed., McGraw-Hill, 2002.

Subject Description Form

Subject Code	EIE399
Subject Title	Data Communications
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims at providing students with a firm foundation about data communications and TCP/IP-based computer networking.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Identify various components in a data communication system, describe their properties, explain how they work and evaluate their performance. 2. Describe how the physical, data link, and network layers operate in a typical data communication system. 3. Understand the system design principles of data communication systems. 4. Design a 1200-baud modem with a given chip set, measure its performance and interface it to a computer via the EIE232 standard to implement a data communication solution. Category B: Attributes for all-roundedness 5. Present ideas and findings effectively. 6. Think critically and learn independently.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 1, 2: This subject contributes to the programme outcome through the teaching of the knowledge of data communications and through providing the students with an opportunity to apply their knowledge. • Programme Outcomes 3, 4: This subject contributes to the programme outcome by providing the opportunity for students to solve practical engineering problems pertaining to the fields of data communications and computer networking. Category B: Attributes for all-roundedness • Programme Outcome 8: This subject contributes to the programme outcome by providing students with an opportunity to think critically about and practice the different data communication techniques for different applications.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Data Communication Systems and Components Distributed processing, protocols and services, interfacing standard, layering architecture. 2. Basic Concepts Line configuration, topology, transmission mode, networks categories. 3. Network Architecture Layering OSI 7-layer model, TCP/IP 4-layer model, typical components in layers. 4. Physical Layer Standards Transmission media, baseband data transmission and encoding methods, passband data transmission and modulation methods, modem design,

interfacing standards, multiplexing.

5. Data Link Layer
   Error control – error detection code and line protocol, flow control, data link layer protocol examples – stop-and-wait protocol, sliding window protocol.

6. Local Area Network
   Ethernet and its variations, LAN internetworking – LAN switches and virtual LAN, wireless LAN, structured cabling system

7. Network Layer
   Internetworking and the Internet, TCP/IP protocol suite – protocol operations and performance

Laboratory Experiments:

1. Mini project: Design and construction of an ITU-T 1200-baud modem with EIA232 interface (12 hours).
2. Analysis of TCP/IP protocol with a packet capturing software (3 hours).
3. Setting up and configuring an Intranet with Cisco routers (3 hours).

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 2, 3	fundamental principles and key concepts of the subject are delivered to students
Tutorials	1, 2, 3, 6	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed
Laboratory sessions/Mini-project	4, 5, 6	students will have practical work on different data communication systems and applications.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
		1	2	3	4	5	6
1. Continuous Assessment (total 50%)							
• Assignments	6%	✓	✓	✓			
• Tests	24%	✓	✓	✓			✓
• Laboratory/Mini-Project	20%				✓	✓	✓
2. Examination	50%	✓	✓	✓		✓	✓
Total	100%						

The continuous assessment will consist of a number of assignments, two to three tests, and practical work.

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

Specific Assessment Methods/Tasks	Remark
Assignments, tests and examination	end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem.
Laboratory/Mini-Project	each group of students are required to develop a modem board; students need to demonstrate the functions of the modem board and describe the implementation details in front of the instructors, and also produce a written report; performance of the demonstration, accuracy and the presentation of the report will be assessed.

Student Study Effort Expected

Class contact (time-tabled):	
• Lecture	28 Hours
• Tutorial	14 Hours
• Laboratory	18 Hours
Other student study effort:	
• Lecture	28 Hours
• Tutorial	7 Hours
• Laboratory	5 Hours
Total student study effort:	100 Hours

Reading List and References

Reference Books:

1. B.A. Forouzan, *Data Communications and Networking*, 3rd ed., McGraw-Hill, c2004
2. D.E. Comer, *Computer Networks and Internets: with Internet Applications*, 4th ed., Prentice-Hall, 2004.

	3. M. Duck, Data *Communications and Computer Networks: for Computer Scientists and Engineers*, 2nd ed., Prentice-Hall, 2003. 4. M. Castelli, *LAN Switching First-step*, Cisco Press, 2005 5. J.T. Geier, *Wireless Networks First-step*, Cisco Press, c2005.

Subject Description Form

Subject Code	ELC3503
Subject Title	English for Engineering Students
Credit Value	2
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to develop those English language skills required by engineering students to communicate effectively in their future professional careers. Attention will be given to developing the core competences the University has identified as vital to the development of effective life-long learning strategies and skills.
Intended Subject Learning Outcomes	**By the end of the subject, students should be able to communicate effectively in workplace contexts through:** 1. presenting information about products or services in writing and orally to either clients/customers or colleagues; 2. writing reports related to workplace contexts; and 3. writing appropriate correspondence related to engineering professions. To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, present ideas systematically and logically, and provide support for stance and opinion.
Subject Synopsis/ Indicative Syllabus	This content is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students. 1. <u>Workplace spoken communication</u> Recognising the purposes of, and differences between spoken and written communication in English in professional contexts; identifying and practising interaction and linguistic skills for oral presentations; preparing and delivering presentations. 2. <u>Workplace correspondence and reports</u> Selecting and using relevant content; organising ideas and information; maintaining appropriate tone, distance and level of formality; achieving coherence and cohesion; adopting an appropriate style, format, structure and layout. 3. <u>Language appropriacy</u> Using context-sensitive language in spoken and written English. 4. <u>Language development</u> Improving and extending relevant features of grammar, vocabulary and pronunciation.
Teaching/Learning Methodology	The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in their future professions. The study method is primarily seminar-project-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. Students will be referred to information on the Internet and the ELC's Centre for Independent Language Learning.

<table>
<tr><td></td><td>Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% weighting</th><th colspan="3">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>Continuous Assessment</td><td></td><td></td><td></td><td></td></tr>
<tr><td>• Technical writing and report writing</td><td>50%</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>• Oral presentation</td><td>25%</td><td>✓</td><td></td><td></td></tr>
<tr><td>• Workplace correspondence</td><td>25%</td><td></td><td></td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="3"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Seminars</td><td>28 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Classwork-related and project-related preparation and self-access work</td><td>56 Hours</td></tr>
<tr><td>Total student study effort:</td><td>84 Hours</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>Coursebook:

1. English Language Centre, ELC 3503 English for Engineering Students. Hong Kong: The Hong Kong Polytechnic University, 2009.

Recommended Readings:

1. A. Ashley, A handbook of commercial correspondence, 2nd ed., Oxford: Oxford University Press, 1992.
2. T. Aspinall and G. Bethell, Test your business vocabulary in use, 1st ed., Cambridge: Cambridge University Press, 2003.
3. G. T. Bilbow, Business writing for Hong Kong, 3rd ed., Hong Kong: Longman, 2004.
4. M. Conradi and R. Hall, That presentation sensation. London: Pearson Education Ltd, 2001.
5. M. E. Guffey, Essentials of business communication, 6th ed., Mason, OH: South-Western College Publication, 2004.
6. K. W. Houp, T. E. Pearsall, E. Tebeaux and S. Dragga, Reporting technical information, 11th ed., New York: Oxford University Press, 2006.
7. E. Sampson, Creative business presentation: Inventive ideas for making an instant impact. London: Kogan Page, 2003.
8. G. R. Walther, Power talking skills: How to say what you mean and get what you want. A video seminar. Newcastle, WA: Speaking From Experience, Inc, 1996.</td></tr>
</table>

	9. F. D. White, *Communicating technology: Dynamic processes and models for writers*. New York: Harper Collins College Publishers, 1996.

Subject Description Form

Subject Code	ENG305
Subject Title	Engineering Management A
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	**This subject provides students with** 1. skills and techniques involved in the management of people and engineering activities in the production of goods and services; 2. skills in the use and understanding of different quality management tools and techniques in an organization, hence enabling students to interpret the quality of work content of typical jobs; 3. the background to understand ethical and business behaviours in engineering organizations, and the changes in management techniques.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. perform tasks in an organization related to organizing, planning, and controlling project and process activities; 2. select appropriate management techniques for improving organizational structures, work procedures, and quality performance of operational tasks; 3. analyze the factors that affect changes in the work environment, and be aware of the approaches in implementing change in an organization; 4. be aware of the imperatives of ethical and business behaviours in engineering organizations in a fast-changing business environment.
Subject Synopsis/Indicative Syllabus	**Syllabus:** 1. <u>Introduction</u> General management concepts in organizations; Functions and types of industrial organizations; Organizational structures; Corporate objectives, strategy, and policy 2. <u>Industrial Management</u> Roles of managers: Process of management, leadership, planning, organizing, motivating, and control of social and engineering activities; Quality management: Related tools and techniques 3. <u>Project Management</u> Project scope and objectives; Network analysis; Tools that support engineering operations and task scheduling 4. <u>Management of Change</u> Strategic leadership and innovation; Organizational change; Leading planned change; Organizational development; Stress management; Factors that affect the execution of change 5. <u>Effects of Environmental Factors</u> The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues

<table>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorial exercises, and case studies are used to deliver various topics in this subject. Some topics are covered by problem-based format whenever applicable in enhancing the learning objectives. Other topics are covered by directed study so as to develop students' "life-long learning" ability.

The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related and applied in real life situations.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="4">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>1. Continuous Assessment (total 40%)</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>• individual presentation</td><td>30%</td><td></td><td></td><td></td><td></td></tr>
<tr><td>• group report</td><td>10%</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Final examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The coursework of this subject involves students working in groups to study cases that reflect the realities of management situations in an engineering setting. Through such exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their written reports on these case studies. A written final examination is also designed to assess the intended learning outcomes.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Lectures and review</td><td>30 Hours</td></tr>
<tr><td>• Tutorials and presentations</td><td>12 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Research and preparation</td><td>30 Hours</td></tr>
<tr><td>• Report writing</td><td>10 Hours</td></tr>
<tr><td>• Preparation for oral presentation and examination</td><td>34 Hours</td></tr>
<tr><td>Total student study effort:</td><td>116 Hours</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>
1. D.L. Babcock and L.C. Morse, Managing Engineering and Technology: an Introduction to Management for Engineers, 3rd Ed., Prentice Hall, 2002.
2. S.P. Robbins and M. Coulter, Management, 8th Ed., Prentice Hall, 2005.
3. J.R. Schermerhorn Jr., Introduction to Management, 10th Ed., Wiley, 2010.
</td></tr>
</table>