



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

Department of
Electronic and Information Engineering
電子及資訊工程學系

BEng (Hons) Degree Programme in Electronic and Information Engineering

Code: 42470; Full-time, Credit-based

**Programme Booklet
(2018/19)**

Department of Electronic and Information Engineering

**Bachelor of Engineering (Honours) Degree Programme in
Electronic and Information Engineering**

Full-time Credit-based

Code: 42470

Programme Booklet

2018/2019

BEng(HONS) IN ELECTRONIC AND INFORMATION ENGINEERING (FULL-TIME)

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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 and readership

This programme booklet is the definitive programme document for the 2018/19 cohort. 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/home/42470.html> for the most updated information. Should there be any discrepancy between the contents of this booklet and University regulations, University regulations always prevail.

1.2 Programme Information

Title of Programme	Bachelor of Engineering (Honours) in Electronic and Information Engineering
Host Department	Department of Electronic and Information Engineering (EIE)
Programme Structure	Credit-based
Final Award	Bachelor of Engineering (Honours) in Electronic and Information Engineering 電子及資訊工程學 (榮譽) 工學士
Mode of Attendance	Full-time
Professional Recognition	The programme has been granted provisional accreditation from the Hong Kong Institution of Engineers (HKIE). Provisional Accreditation Status enjoys all the rights and privileges that are equivalent to an accreditation status.

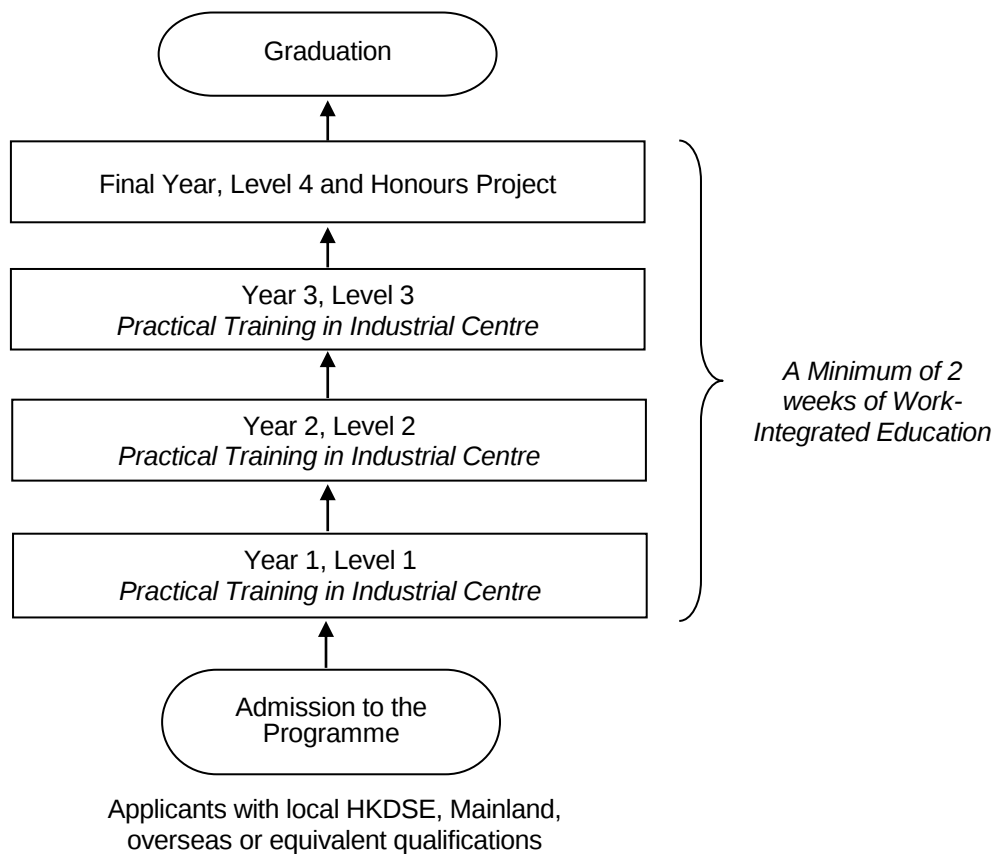
Duration	Normal Year 1 Intake Full-time Mode: <u>4</u> years nominal, <u>8</u> years maximum Senior Year Intake Full-time Mode: <u>2</u> years nominal, <u>4</u> years maximum
Total Credits for Graduation (Academic Credits + Training Credits + WIE Training Credit)	Academic Credits: • Normal Year 1 Intake: - HKDSE students who <u>have</u> Level 2 or above in <u>HKDSE Physics or Combined Science with Physics</u>, and non-local students from the Chinese Mainland who <u>have</u> a Pass (a pass is taken as 60% of the total marks of the subject) in the <u>Physics or Integrated Science subject</u> in the Joint Entrance Examination for Universities: <u>124 credits</u> - HKDSE students <u>who do not have</u> Level 2 or above in <u>HKDSE Physics or Combined Science with Physics</u>, and non-local students from the Chinese Mainland who <u>do not have</u> a Pass (a pass is taken as 60% of the total marks of the subject) in the <u>Physics or Integrated Science subject</u> in the Joint Entrance Examination for Universities: <u>127 credits</u> • Senior Year Intake: <u>67 credits</u> Training Credits: <u>8</u> (for all intakes) Work-Integrated Education Training Credit: <u>1</u> (for all intakes)

1.3 Modes of Attendance

A mode of study is characterized by the credits and subjects required and the progression pattern in Year 1 to Year 4 (or in Year 1 to Year 2 for Senior Year Intake).

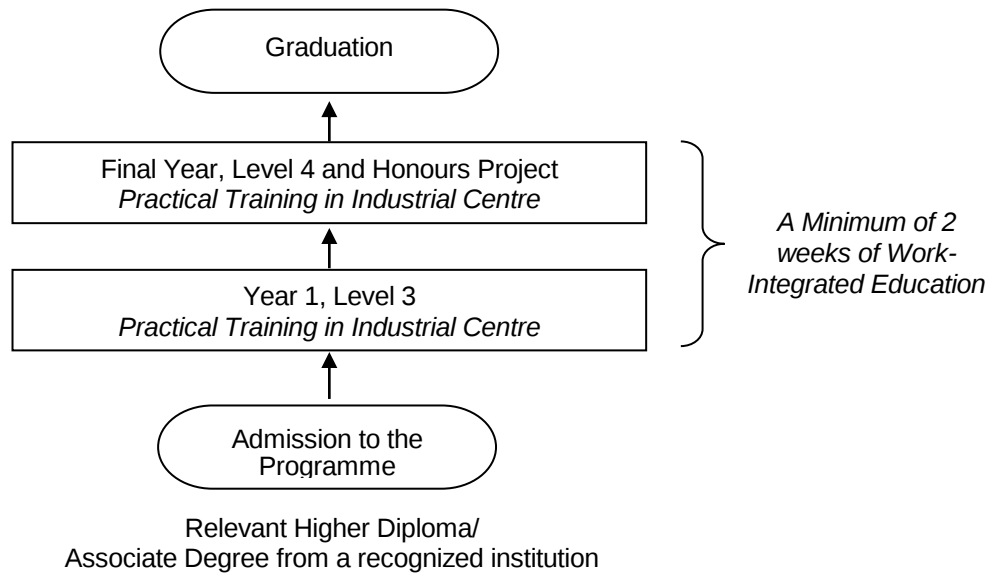
Normal Year 1 Intake Full-time Mode

Under this mode, the students will normally pursue their study by going through Year 1, Year 2, Year 3 and Year 4 in full time and then graduate at the end of Year 4 after having satisfied all programme requirements.



Senior Year Intake Full-time Mode

Under this mode, senior year students will normally pursue their study by going through Year 1 and Year 2 in full time and then graduate at the end of Year 2 after having satisfied all programme requirements.



- 1.4 In addition to pursuing the BEng(Hons) in Electronic and Information Engineering as a Major, students studying in the Normal Year 1 Intake Full-time Mode may apply to study for an additional Minor. However, the additional Minor option is not available to students studying in the Senior Year Intake Full-time Mode.

2. RATIONALE, AIMS AND INTENDED LEARNING OUTCOMES OF THE PROGRAMME

2.1 Background and Rationale

Electronic and information engineering are among the key technologies that play important roles in daily living. Various sectors, such as business, commerce, communication, education, entertainment, healthcare and transportation, require electronic and information engineering for smooth operation. Hence, it is envisioned that there is a great need of professionals who exercise knowledge and leadership in the areas of electronic and information engineering, as well as generic skills of problem solving, innovation, analysis and adaptability to contribute to the technological and economic development in the region and in the world.

2.2 Aims

This Programme aims at producing graduates with:

1. a wide range of professional knowledge and skills relevant to electronic and information engineering,
2. creativity and innovation,
3. adaptability to changing technology and society, and
4. all-rounded attributes.

2.3 Relationship of Programme Aims to University Missions

The University has the following missions:

1. To pursue impactful research that benefits the world.
2. To nurture critical thinkers, effective communicators, innovative problem solvers and socially responsible global citizens.
3. To foster a University community in which all members can excel in their aspirations with a strong sense of belonging and pride.

The following table illustrates the relationship between Programme Aims and University Missions:

Programme Aims	University Missions		
	1	2	3
1	X	X	X
2	X	X	
3	X	X	
4		X	X

2.4 Institutional Learning Outcomes

It is PolyU's educational mission to nurture competent professionals who are also critical thinkers, effective communicators, innovative problem solvers, lifelong learners, and ethical leaders. The institutional learning outcomes for these attributes are provided as follows:

1. **Competent professional:** Graduates should be able to integrate and apply in practice the fundamental knowledge and skills required for functioning effectively as entry-level professionals.
2. **Critical thinker:** Graduates should be able to examine and critique the

validity of information, arguments, and different viewpoints, and reach a sound judgment on the basis of credible evidence and logical reasoning.

3. **Effective communicator:** Graduates should be able to comprehend and communicate effectively in English and Chinese, orally and in writing, in professional and daily contexts.
4. **Innovative problem solver:** Graduates should be able to identify and define problems in professional and daily contexts, and produce creative and workable solutions to the problems.
5. **Lifelong learner:** Graduates should recognise the need for continual learning and self-development, and be able to plan, manage and improve their own learning in pursuit of self-determined development goals.
6. **Ethical leader:** Graduates should have an understanding of leadership and be prepared to lead a team, and should acknowledge their responsibilities as professionals and citizens to society and their own nation, and be able to demonstrate ethical reasoning in professional and daily contexts.

2.5 Intended Learning Outcomes of the Programme

On successful completion of the BEng(Hons) in Electronic and Information Engineering programme, students will be able to:

Category A Professional/Academic Knowledge and Skills

1. Understand the fundamentals of science and engineering, and have the ability to apply them.
2. Design and conduct experiments, as well as to evaluate the outcomes.
3. Design systems, components and processes to meet given specifications and constraints.
4. Identify, formulate and solve problems relevant to EIE.
5. Use modern engineering/IT tools appropriate to EIE practice.
6. Know the contemporary issues, and understand the impact of engineering solutions in a global and societal context.

Category B Attributes for All-roundedness

7. Work with others collaboratively in a multi-disciplinary team and have a knowledge of leadership.
8. Recognize social, professional and ethical responsibility.
9. Communicate effectively.
10. Recognize the need for and engage in life-long learning.

2.6 Relationship of Programme Outcomes to Programme Aims

The following table illustrates the relationship between Programme Outcomes and Programme Aims:

Programme Outcomes	Programme Aims			
	1	2	3	4
1	X		X	
2	X	X	X	
3	X	X	X	
4	X	X	X	
5	X		X	
6	X		X	X
7				X
8	X		X	X
9				X
10			X	X

2.7 Relationship of Intended Learning Outcomes of the Programme to Institutional Learning Outcomes

The following table illustrates the relationship between Intended Learning Outcomes of the Programme and Institutional Learning Outcomes:

Programme Outcomes	Institutional Learning Outcomes					
	1	2	3	4	5	6
1	X					
2	X	X				
3	X	X		X		
4	X			X		
5	X					
6	X	X				X
7						X
8						X
9			X			
10					X	

3. ENTRANCE REQUIREMENTS

For non-local students who enter this Programme by following a different education system from that in Hong Kong, they must possess the non-local qualifications for meeting the general entrance requirements for Bachelor Degree Programmes as published by the University.

For students who enter this programme by following the Hong Kong Diploma of Secondary Education (HKDSE) system or other local qualifications, they must satisfy both the University general minimum entrance requirements AND the programme-specific requirements as set out below.

3.1 University General Minimum Entrance Requirements

3.1.1 For those applying on the basis of HKDSE:

- 4 core subjects and 2 elective subjects with
 - Level 3: English Language and Chinese Language
 - Level 2: Mathematics, Liberal Studies
 - Level 3: Two elective subjects [can include Extended Modules of Mathematics (M1/M2)]

3.1.2 For those applying on the basis of other local qualifications:

- An appropriate Diploma (as specified in section 3.2 below) passed with credit or a Higher Certificate (as specified in section 3.2 below) from a recognised institution; OR
- An appropriate Associate Degree/Higher Diploma from a recognised institution (suitable candidates will be considered for advanced standing entry to the senior year curriculum).

3.1.3 Other local/non-local qualifications deemed to be acceptable for admission purpose:

The University accepts attainments in HKALE / HKASLE, GCEALE / GCEASLE and IB for admission to its 4-year degree programmes. Applicants holding A-Level and IB qualifications will be granted credit transfer upon admission.

3.2 Programme-specific Minimum Entrance Requirements

3.2.1 For those applying on the basis of HKDSE:

- Level 3 in two elective subjects, preferably Physics, Biology, Chemistry, Combined Science, Information and Communication Technology or Extended modules of Mathematics.

3.2.2 For those applying on the basis of other qualifications:

- An Associate Degree, Higher Diploma, Higher Certificate or Diploma (with Credit) in Engineering, Electronic Engineering, Information Engineering, Communication Engineering, Electrical Engineering, Computer Engineering or other similar disciplines.

3.2.3 For those applying on the basis of “advanced standing” status:

- Holders of Associate Degree/Higher Diploma in Electronic (and Information) Engineering, Electrical Engineering or other similar disciplines may be given credit transfer.

3.3 Admission of Advanced Standing Students Based On Advanced Academic Qualifications

- (i) With approval by the Faculty, students may be admitted to the Programme beyond the initial stage provided they have demonstrably reached the general level of educational development which would have been reached had they taken the earlier stage(s) of the Programme, and provided that there is a high probability that they will complete the Programme successfully. These students will still be labelled as first year students even though they are following the curriculum of a later stage.
- (ii) Students admitted on the basis of IB/A-Level qualifications will be given credit transfer, up to a maximum of 25% of the credit requirement for a 4-year degree programme in which 6 credits are for the Cluster Area Requirement (CAR), 3 credits for Freshmen Seminar, and 3 credits for University English. For IB/GCE candidates who are able to attain the specified grade and total score requirements, a maximum of 6 credits could be further given from the English and Chinese LCR subjects. Any further credit transfer on the remaining CAR or discipline-specific subjects will be decided by the programme host department.

- (iii) The number of credits that a student is required to complete for the award concerned will be determined at the time of admission, and no later than the end of the subject add/drop period.
- (iv) Information on the number of credits required for normal entry and for the individual students based on their admission qualifications will both be reflected on the transcripts of study.
- (v) If students who are admitted to the programme with entry credit transfer wish to gain higher grades by studying the subject(s) again, they may approach their programme offering Department for declining the provision of taking fewer credits no later than the end of the add/drop period.
- (vi) Students who, upon admission, wish to transfer any credits from their previous studies, and take fewer credits than those confirmed at the time of admission, will have to follow the procedures for "application for credit transfer" and to pay the related fees. The credits to be transferred are subject to the rule on validity period for subject credits.

4. PROGRAMME, SUBJECTS, AND CREDITS

4.1 Programme Specified Subjects

Most subjects to be studied at Year 1, Year 2, Year 3 and Year 4 are of standard credit value carrying 3 credits each, except for some subjects, such as Integrated Project, Honours Project, Professional Communication, etc. which carry credits other than 3. A student is expected to spend about 35 to 45 hours of study (inclusive of class contact and other study effort) to earn a credit. Table 4.1 lists the subjects, their credit values, and the category they belong to (Compulsory or Elective). All discipline-specific subjects shown as compulsory are non-deferrable and must be taken in accordance to the progression pattern. The subjects offered will be updated from time to time according to the need of society and the profession.

Students admitted to the programme through the Normal Year 1 entry route are required to complete a minimum of 124 or more academic credits to satisfy the degree requirements, while students admitted to the programme through Senior Year entry route are required to complete a minimum of 67 or more academic credits to satisfy the degree requirements. The exact minimum number of academic credits required will depend on the academic background of the students. The subjects contributing to the

124 or 67 academic credits are listed in Table 4.1. However, they may choose to take additional subjects beyond the basic requirements. Please refer to Section 26 for detailed information on the requirements for graduation.

Table 4.1 Subjects Category and Credits

Year 1, Year 2, Year 3 and Year 4 Curricula

Subject Code	Subject Title	CR	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
General University Requirements (GUR)				
-	Cluster-Area Requirement I (CAR I)	3	COM	COM
-	Cluster-Area Requirement II (CAR II)	3	COM	COM
-	Cluster-Area Requirement III (CAR III)	3	COM	-
-	Cluster-Area Requirement IV (CAR IV)	3	COM	-
-	Language and Communication Requirement I (LCR I) – English *	3	COM	-
-	Language and Communication Requirement II (LCR II) – English *	3	COM	-
-	Language and Communication Requirement III (LCR III) – Chinese *	3	COM	-
-	Leadership and Intra-Personal Development	3	COM	-
-	Service-Learning	3	COM	COM
ENG1003	Freshman Seminar for Engineering	3	COM	-
-	Healthy Lifestyle	0	COM	-
Discipline-Specific Requirement (DSR)				
AF3625	Engineering Economics	3	COM	COM
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics	3	COM	-
AMA1120	Basic Mathematics II –Calculus and Linear algebra	3	COM	-
AMA2104	Probability and Engineering Statistics	3	COM	COM
AMA2111	Mathematics I	3	COM	-
AMA2112	Mathematics II	3	COM	-
AP10001	Introduction to Physics	3	COM ⁽¹⁾	-
AP10005	Physics I	3	COM	-
AP10006	Physics II	3	COM	-
CBS3241	Professional Communication in Chinese	2	COM	COM
EIE2100	Basic Circuit Analysis	3	COM ⁽³⁾	-
EE2002A/B	Circuit Analysis	3		
EIE2102	Basic Electronics	3	COM ⁽⁴⁾	-
EE2003A/B	Electronics	3		
EIE2211	Logic Design	3	COM	-
EIE3100	Analogue Circuit Fundamentals	3	COM	COM
EIE3105	Integrated Project	6	COM	COM
EIE3109	Mobile Systems and Application Development	3	ELE	ELE

Subject Code	Subject Title	CR	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
EIE3112	Database System	3	ELE	ELE
EIE3305	Integrated Analogue and Digital Circuits	3	ELE	ELE
EIE3311	Computer System Fundamentals	3	COM	COM
EIE3312	Linear Systems	3	COM	COM
EIE3320	Object-Oriented Design and Programming	3	ELE	ELE
EIE3331	Communication Fundamentals	3	COM	COM
EIE3333	Data and Computer Communications	3	COM	COM
EIE4100	Computer Vision and Pattern Recognition	3	ELE	ELE
EIE4102	IP Networks	3	ELE	ELE
EIE4103	Mobile Computer System Architecture	3	ELE	ELE
EIE4104	Mobile Networking	3	ELE	ELE
EIE4105	Multimodal Human Computer Interaction Technology	3	ELE	ELE
EIE4106	Network Management and Security	3	ELE	ELE
EIE4108	Distributed Systems and Cloud Computing	3	ELE	ELE
EIE4110	Introduction to VLSI and Computer-Aided Circuit Design	3	ELE	ELE
EIE4112	Avionics Systems	3	ELE	ELE
EIE4113	Wireless and Mobile Systems	3	ELE	ELE
EIE4114	Digital Forensics for Crime Investigation	3	ELE	ELE
EIE4115	Intrusion Detection and Prevention	3	ELE	ELE
EIE4116	Surveillance Studies and Technologies	3	ELE	ELE
EIE4402	Power Electronics	3	ELE	ELE
EIE4413	Digital Signal Processing	3	COM	COM
EIE4432	Web Systems and Technologies	3	ELE	ELE
EIE4433	Honours Project	6	COM	COM
EIE4435	Image and Audio Processing	3	ELE	ELE
EIE4449	Optical Communication Systems and Networks	3	ELE	ELE
ELC3521	Professional Communication in English	2	COM	COM
ENG2001	Fundamentals of Materials Science and Engineering	3	COM ⁽²⁾ (Select any 1 subject out of these 6 subjects)	-
ABCT1101	Introductory Life Science	3		
ABCT1301	Chemistry and Modern Living	3		
ABCT1314	Chemistry and Sustainable Development	3		
ABCT1303	Biotechnology and Human Health	3		
BME11101	Bionic Human and the Future of Being Human	3		
ENG2002	Computer Programming	3	COM	-
ENG2003	Information Technology	3	COM	-
ENG3003	Engineering Management	3	COM	COM
ENG3004	Society and The Engineer	3	COM	COM
ENG4001	Project Management	3	ELE	ELE
IC2114	Industrial Centre Training I for EIE	5	TRN	TRN
IC382	Multidisciplinary Manufacturing Project	3	TRN	TRN

Note:

AF	School of Accounting and Finance
ABCT	Department of Applied Biology and Chemical Technology
AMA	Department of Applied Mathematics
AP	Department of Applied Physics
BME	Interdisciplinary Division of Biomedical Engineering
CBS	Department of Chinese and Bilingual Studies
COM	Compulsory
EIE	Department of Electronic and Information Engineering
ELC	English Language Centre
ELE	Elective
ENG	Faculty of Engineering
IC	Industrial Centre
TRN	Training

* Details of the Language and Communication Requirement (LCR) are set out in Section 4.2.

(1) For HKDSE students who do not have Level 2 or above in HKDSE Physics or Combined Science with Physics, and non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities only.

(2) Students should choose 1 subject in either “Engineering Materials”, “Biology” or “Chemistry”:

Engineering Materials: ENG2001 Fundamentals of Materials Science and Engineering
Biology: ABCT1101 Introductory Life Science

ABCT1303 Biotechnology and Human Health

BME11101 Bionic Human and the Future of Being Human

Chemistry: ABCT1301 Chemistry and Modern Living

ABCT1314 Chemistry and Sustainable Development

Students choosing any one of the five subjects in the “Biology” and “Chemistry” areas will have the subject double-counted towards the fulfilment of both the Discipline-Specific Requirement (DSR) and CAR-D (Science, Technology and Environment). They are required to choose any 3-credit subject (from level 1 to level 4) to make up for the total credit requirement.

(3) Students will take EIE2100 Basic Circuit Analysis by default but they will be allowed to choose EE2002A/B Circuit Analysis in case they cannot take EIE2100 due to reasons such as time-table clash, need to retake immediately in succeeding semester after failure, etc.

(4) Students will take EIE2102 Basic Electronics by default but they will be allowed to choose EE2003A/B Electronics in case they cannot take EIE2102 due to reasons such as time-table clash, need to retake immediately in succeeding semester after failure, etc.

Subject to the approval by the Programme Leader, students may take at most one Level 5 subject per semester as a final-year technical elective during their final year of study. The total number of Level 5 subjects taken shall not exceed 2. The following is the list of Level 5 subjects currently available.

Subject Code	Subject Title	CR	Category of Subjects
EIE509	Satellite Communications - Technology and Applications	3	ELE
EIE511	VLSI System Design	3	ELE
EIE522	Pattern Recognition: Theory & Applications	3	ELE
EIE529	Digital Image Processing	3	ELE
EIE546	Video Technology	3	ELE
EIE552	Internet Technologies for Multimedia Applications	3	ELE
EIE553	Security in Data Communication	3	ELE
EIE557	Computational Intelligence and its Applications	3	ELE
EIE558	Speech Processing and Recognition	3	ELE
EIE563	Digital Audio Processing	3	ELE
EIE566	Wireless Communications	3	ELE
EIE567	Wireless Power Transfer Technologies	3	ELE
EIE568	IoT - Tools and Applications	3	ELE
EIE569	Sensor Networks	3	ELE
EIE575	Vehicular Communications and Inter-Networking Technologies	3	ELE
EIE577	Optoelectronic Devices	3	ELE
EIE579	Advanced Telecommunication Systems	3	ELE
EIE580	RF and Microwave Integrated Circuits for Communication System Applications	3	ELE
EIE581	Optical Wavelength Division Multiplexing Networks	3	ELE
EIE583	Advanced Power Semiconductor Devices and Design Criteria for Applications	3	ELE
EIE585	OFDM & MIMO Wireless Communications	3	ELE
EIE587	Channel Coding	3	ELE
EIE589	Wireless Data Network	3	ELE

4.2 Language and Communication Requirements (LCR)

Students are required to fulfil the four major components of the overall English and Chinese language requirements below in order to be eligible for graduation:

- (i) Language and Communication Requirements (LCR) in English (6 credits) and Chinese (3 credits), as stated in Sections 4.2.1 and 4.2.2 below;
- (ii) Writing Requirement, as stated in Section 4.2.3 below;
- (iii) Reading Requirement, as stated in Section 4.2.4 below; and
- (iv) Discipline-Specific Language Requirement, as stated in Section 4.2.5 below.

Senior year students would be considered for credit transfer for 4.2 (i) based on their previous studies in AD/HD programmes and their academic performance. Students not meeting the equivalent standard of the Undergraduate Degree LCR will be required to take degree LCR subjects on top of the normal curriculum requirement. The Department will refer to the guidelines provided by the Language Centres (ELC and CBS) to determine whether a new student has met the equivalent standard.

4.2.1 English

All undergraduate students must successfully complete two 3-credit English language subjects as stipulated by the University (Table A), according to their English language proficiency level. These subjects are designed to suit students' different levels of English language proficiency at entry, as determined by their HKDSE score or the English Language Centre (ELC) entry assessment (when no HKDSE score is available, e.g. in the case of non-local students).

Students entering the University with specified attainment grades in certain public examinations can be given credit transfer or exemption for one or both LCR English subjects.

Table A: English LCR subjects (each 3 credits)

English language competence level/ Subject	<i>Practical English for University Studies</i>	<i>English for University Studies</i>	Any LCR Proficient level elective subject in English (Table B)
HKDSE Level 4 and above or equivalent	--	Subject 1	Subject 2
HKDSE Level 3 or equivalent	Subject 1	Subject 2	--

Table B: Proficient level elective subjects for DSE Level 4 students and above (or equivalent) (each 3 credits)

LCR Proficient level elective subjects	Advanced English for University Studies
	Advanced English Reading and Writing Skills
	English in Literature and Film
	Persuasive Communication

(The above framework will also apply to students on Senior Year curriculum.)

4.2.2 Chinese

All undergraduate students are required to successfully complete one 3-credit Chinese language subject successfully as stipulated by the University, according to their Chinese language proficiency level. (Table C).

Table C: Chinese LCR subjects

Categories of students	Required subject
For Chinese speaking students	A Chinese LCR subject
For non-Chinese speakers or students whose Chinese standards are at junior secondary level or below	One subject from Table D below

Table D: Chinese LCR subjects for non-Chinese speakers or students whose Chinese standards are at junior secondary level or below

Subject (3 credits)	Pre-requisite/exclusion
Chinese I (for non-Chinese speaking students)	For non-Chinese speaking students at beginners' level
Chinese II (for non-Chinese speaking students)	- For non-Chinese speaking students; and - Students who have completed Chinese I or equivalent
Chinese III (for non-Chinese speaking students)	- For non-Chinese speaking students at higher competence levels; and - Students who have completed Chinese II or equivalent
Chinese IV (for Non-Chinese speaking students)	- For non-Chinese students at intermediate competence levels; and - Students who have completed Chinese III or equivalent
Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students)	For non-Chinese speaking students at higher competence levels

Students who have obtained verified qualifications or certain results in some public examinations [e.g. HKDSE, HKALE, JEE, GSAT(Taiwan)] will be granted exemption for the Chinese LCR subject. (Conditions for the exemption will be worked out in due course.)

(The above framework and exemption arrangements will also apply to students on Senior Year curriculum.)

4.2.3 Writing Requirement in CAR Subjects

In addition to the LCR in English and Chinese explained above, all students must also, among the Cluster Areas Requirement (CAR) subjects they take, pass one subject that requires a substantial piece of writing in English and one subject that requires a substantial piece of writing in Chinese. Students who are non-Chinese speakers or those whose Chinese standards are at junior secondary level or below will be exempted from the Chinese Writing requirement.

4.2.4 Reading Requirement in CAR Subjects

All students must, among the CAR subjects they take, must pass one subject that requires the reading of an extensive text in English and one subject that requires the reading of an extensive text in Chinese. Students who are non-Chinese speakers or those whose Chinese standards are at junior secondary level or below will be exempted from the Chinese Reading requirement.

A list of approved CAR subjects for meeting the Writing Requirement (with a “W” designation) and for meeting the Reading Requirement (with an “R” designation) is shown at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

4.2.5 Discipline-Specific Language Requirement

In addition to the LCR mentioned in Sections 4.2.1 to 4.2.4 above, students also have to complete the subject “Professional Communication” (2 credits in English and 2 credits in Chinese) as the discipline-specific language requirements.

Students who are non-Chinese speakers or those whose Chinese standards are at junior secondary level or below will be exempted from the Discipline-Specific Chinese Language requirement, i.e. CBS3241P Professional

Communication in Chinese. These students must take 1 subject of any level to make up for the minimum total credit requirement.

5. SPECIFIED PROGRESSION PATTERN

- 5.1 Normal Year 1 Intake:
- HKDSE students who have Level 2 or above in HKDSE Physics or Combined Science with Physics
 - Non-local students from the Chinese Mainland who have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities

Year 1	
Semester 1 (12 credits)	Semester 2 (18 credits)
IC2114 Industrial Centre Training I for EIE (5 training credits)	
AMA1110 Basic Mathematics I – Calculus and Probability & Statistics (3 credits)	AMA1120 Basic Mathematics II – Calculus and Linear algebra (3 credits)
AP10005 Physics I (3 credits)	AP10006 Physics II (3 credits)
ENG1003 Freshman Seminar for Engineering (3 credits)	CAR I (3 credits) ^{Note 1}
LCR I – English (3 credits)	ENG2003 Information Technology (3 credits)
	LCR II – English (3 credits)
	Leadership and Intra-Personal Development (3 credits)
Healthy Lifestyle (0 credit) ^{Note 1}	
Year 2	
Semester 1 (18 credits)	Semester 2 (15 credits)
IC2114 Industrial Centre Training I for EIE (continued)	
AMA2111 Mathematics I (3 credits)	AF3625 Engineering Economics (3 credits)
CAR II (3 credits) ^{Note 1}	AMA2112 Mathematics II (3 credits)
EIE2100 Basic Circuit Analysis (3 credits)	EIE2102 Basic Electronics (3 credits)
ENG2002 Computer Programming (3 credits)	EIE2211 Logic Design (3 credits)
LCR III – Chinese (3 credits)	EIE3312 Linear Systems (3 credits)
Choose one subject in either “Engineering Materials”, “Biology” or “Chemistry” (3 credits)	
Year 3	
Semester 1 (15 credits)	Semester 2 (18 credits)
EIE3105 Integrated Project (6 credits)	
IC382 Multidisciplinary Manufacturing Project (3 training credits)	
AMA2104 Probability and Engineering Statistics (3 credits)	EIE3331 Communication Fundamentals (3 credits)
EIE3100 Analogue Circuit Fundamentals (3 credits)	EIE4413 Digital Signal Processing (3 credits)
EIE3311 Computer System Fundamentals (3 credits)	Technical Elective 1 (3 credits) ^{Note 2}
Service-Learning (3 credits) ^{Note 1}	EIE3333 Data and Computer Communications (3 credits)
	CAR III (3 credits) ^{Note 1}
Year 4	
Semester 1 (15 credits)	Semester 2 (13 credits)
EIE4433 Honours Project (6 credits)	
CAR IV (3 credits) ^{Note 1}	CBS3241P Professional Communication in Chinese (2 credits)
ENG3003 Engineering Management (3 credits)	ELC3521 Professional Communication in English (2 credits)
Technical Elective 2 (3 credits) ^{Note 2}	ENG3004 Society and the Engineer (3 credits)
Technical Elective 3 (3 credits) ^{Note 2}	Technical Elective 4 (3 credits) ^{Note 2}

Total Number of Credits: 124

Note 1: The study pattern for the subjects is indicative only. Students may take these subjects according to their own schedule. They are recommended to consult their Academic Advisor for guidance and planning if necessary.

Note 2: At least 2 technical electives must be at level 4 or above.

Note 3: The programme has been granted provisional accreditation from the Hong Kong Institution of Engineers (HKIE). Provisional Accreditation Status enjoys all the rights and privileges that are equivalent to an accreditation status.

- 5.2 Normal Year 1 Intake:
- HKDSE students who do not have Level 2 or above in HKDSE Physics or Combined Science with Physics
 - Non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities

Year 1	
Semester 1 (12 credits)	Semester 2 (18 credits)
IC2114 Industrial Centre Training I for EIE (5 training credits)	
AMA1110 Basic Mathematics I – Calculus and Probability & Statistics (3 credits)	AMA1120 Basic Mathematics II – Calculus and Linear algebra (3 credits)
AP10001 Introduction to Physics (3 credits)	AP10006 Physics II (3 credits)
ENG1003 Freshman Seminar for Engineering (3 credits)	CAR I (3 credits) ^{Note 1}
LCR I – English (3 credits)	LCR II – English (3 credits)
	ENG2003 Information Technology (3 credits)
	Leadership and Intra-Personal Development (3 credits)
Healthy Lifestyle (0 credit) ^{Note 1}	
Year 2	
Semester 1 (18 credits)	Semester 2 (15 credits)
IC2114 Industrial Centre Training I for EIE (continued)	
AMA2111 Mathematics I (3 credits)	AF3625 Engineering Economics (3 credits)
AP10005 Physics I (3 credits)	AMA2112 Mathematics II (3 credits)
EIE2100 Basic Circuit Analysis (3 credits)	EIE2102 Basic Electronics (3 credits)
ENG2002 Computer Programming (3 credits)	EIE2211 Logic Design (3 credits)
LCR III – Chinese (3 credits)	EIE3312 Linear Systems (3 credits)
Choose one subject in either “Engineering Materials”, “Biology” or “Chemistry” (3 credits)	
Year 3	
Semester 1 (15 credits)	Semester 2 (18 credits)
EIE3105 Integrated Project (6 credits)	
IC382 Multidisciplinary Manufacturing Project (3 training credits)	
CAR II (3 credits) ^{Note 1}	EIE3331 Communication Fundamentals (3 credits)
AMA2104 Probability and Engineering Statistics (3 credits)	EIE4413 Digital Signal Processing (3 credits)
EIE3100 Analogue Circuit Fundamentals (3 credits)	Service-Learning (3 credits) ^{Note 1}
EIE3311 Computer System Fundamentals (3 credits)	Technical Elective 1 (3 credits) ^{Note 2}
	EIE3333 Data and Computer Communications (3 credits)
Year 4	
Semester 1 (15 credits)	Semester 2 (16 credits)
EIE4433 Honours Project (6 credits)	
CAR III (3 credits) ^{Note 1}	CAR IV (3 credits) ^{Note 1}
ENG3003 Engineering Management (3 credits)	CBS3241P Professional Communication in Chinese (2 credits)
Technical Elective 2 (3 credits) ^{Note 2}	ELC3521 Professional Communication in English (2 credits)
Technical Elective 3 (3 credits) ^{Note 2}	ENG3004 Society and the Engineer (3 credits)
	Technical Elective 4 (3 credits) ^{Note 2}

Total Number of Credits: 127

Note 1: The study pattern for the subjects is indicative only. Students may take these subjects according to their own schedule. They are recommended to consult their Academic Advisor for guidance and planning if necessary.

Note 2: At least 2 technical electives must be at level 4 or above.

Note 3: The programme has been granted provisional accreditation from the Hong Kong Institution of Engineers (HKIE). Provisional Accreditation Status enjoys all the rights and privileges that are equivalent to an accreditation status.

- 5.3 Senior Year Intake:
- For Senior Year students with relevant Higher Diploma/Associate Degree from a recognized institution ^{Note 3}

Year 1	
Semester 1 (15 credits)	Semester 2 (18 credits)
EIE3105 Integrated Project (6 credits)	
AMA2104 Probability and Engineering Statistics (3 credits)	EIE3312 Linear Systems (3 credits)
EIE3100 Analogue Circuit Fundamentals (3 credits)	EIE3331 Communication Fundamentals (3 credits)
EIE3311 Computer System Fundamentals (3 credits)	ENG3004 Society and the Engineer (3 credits)
Service-Learning (3 credits)	Technical Elective 1 (3 credits) ^{Note 2}
	EIE3333 Data and Computer Communications (3 credits)
IC2114 Industrial Centre Training I for EIE (5 training credits)	IC2114 Industrial Centre Training I for EIE (continued)
Year 2	
Semester 1 (18 credits)	Semester 2 (16 credits)
EIE4433 Honours Project (6 credits)	
AF3625 Engineering Economics (3 credits)	CAR II (3 credits) ^{Note 1,4}
CAR I (3 credits) ^{Note 1, 4}	CBS3241P Professional Communication in Chinese (2 credits)
ENG3003 Engineering Management (3 credits)	EIE4413 Digital Signal Processing (3 credits)
Technical Elective 2 (3 credits) ^{Note 2}	ELC3521 Professional Communication in English (2 credits)
Technical Elective 3 (3 credits) ^{Note 2}	Technical Elective 4 (3 credits) ^{Note 2}
IC382 Multidisciplinary Manufacturing Project (3 training credits)	IC382 Multidisciplinary Manufacturing Project (continued)

Total Number of Credits: 67 ^{Note 5}

Note 1: The study pattern for the subjects is indicative only. Students may take these subjects according to their own schedule. They are recommended to consult their Academic Advisor for guidance and planning if necessary.

Note 2: At least 2 technical electives must be at level 4 or above.

Note 3: This is an example only, which shows a possible study pattern for graduates with relevant Higher Diploma/Associate Degree from a recognized institution. The exact study pattern for senior year intakes varies from student to student depending on the approved subjects transferred.

Note 4: 6 credits of Cluster Areas Requirement (CAR) from two different cluster areas. Students also need to fulfil the English and Chinese reading and writing requirements and take 3 of the 6 CAR credits designated as "China-related" (China Studies Requirement), if such requirements have not been fulfilled in previous studies.

Note 5: The credits required and progression pattern presented above are for students who have been given credit transfer of the 9 credits Undergraduate Degree LCR subjects based upon their previous studies. Students not meeting the equivalent standard of the Undergraduate Degree LCR will be required to take the required subjects. Details on the Undergraduate Degree LCR subjects are given in section 4.2 of this booklet.

Note 6: The programme has been granted provisional accreditation from the Hong Kong Institution of Engineers (HKIE). Provisional Accreditation Status enjoys all the rights and privileges that are equivalent to an accreditation status.

6. CURRICULUM MAP

Alignment of Subjects with Programme Intended Learning Outcomes:

	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
A. GENERAL UNIVERSITY REQUIREMENTS (GUR)										
Language and Communication Requirements (LCR)										
LCR - English - ELCXXXX (2 Subjects)									T,P	
LCR - Chinese - CBSXXXX (1 Subject)									T,P	
Cluster-Area Requirements (CAR) (4 Subjects)										
CAR - Cluster-Area Requirement Subjects+								T,P	T,P	T,P
Other Requirements										
ENG1003 Freshman Seminar for Engineering							T,P, M		T,P	T,P
LIPD - Leadership and Intra-Personal Development							T,P		T,P	
SL - Service-Learning								T,P		
B. DISCIPLINE-SPECIFIC REQUIREMENTS (DSR)										
Compulsory - Mathematics and Basic Sciences Subjects										
AMA1110 Basic Mathematics I – Calculus and Probability & Statistics				T,P	T,P					T
AMA1120 Basic Mathematics II – Calculus and Linear algebra				T,P	T,P					T
AMA2104 Probability and Engineering Statistics	T,P			T,P	T,P				T,P	T
AMA2111 Mathematics I				T,P	T,P					T
AMA2112 Mathematics II				T,P	T,P					T
AP10001 Introduction to Physics	T,P			T,P						T
AP10005 Physics I	T,P			T,P						
AP10006 Physics II	T,P			T,P						
<i>Choose one subject in either “Engineering Materials”, “Biology” or “Chemistry” below:</i>										
ENG2001 Fundamentals of Materials Science and Engineering/	T,P		T,P							
ABCT1101 Introductory Life Science/	T,P		T,P							
ABCT1301 Chemistry and Modern Living/	T,P		T,P							
ABCT1314 Chemistry and Sustainable Development/	T,P		T,P							
ABCT1303 Biotechnology and Human Health/	T,P		T,P							
BME11101 Bionic Human and the Future of Being Human	T,P					T,P		T	T,P	
Compulsory - Engineering Subjects										
EIE2100 Basic Circuit Analysis/ EE2002A/B Circuit Analysis	T,P	T,P								
EIE2102 Basic Electronics/ EE2003A/B Electronics	T,P	T,P								
EIE2211 Logic Design	T	P	P	T,P	P					
EIE3100 Analogue Circuit Fundamentals	T,P			T,P, M						
EIE3105 Integrated Project	T,P	T,P	T,P, M	T,P	T,P		T,M		T,P, M	
EIE3311 Computer System Fundamentals	T	P	T							
EIE3312 Linear Systems	T,P	T,P	T,P	T	P					T

	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
EIE3331 Communication Fundamentals	T	T,P	T,P	T	T,P				T	
EIE3333 Data and Computer Communications	T	T,P		T	T,P				T	
EIE4413 Digital Signal Processing	T,M	P	T,P,M	T	P					T
ENG2002 Computer Programming			T,P	T,P	T,P					
ENG2003 Information Technology				T,P	T,P					
Compulsory - Language and Complementary Studies										
CBS3241P Professional Communication in Chinese									T,P,M	
ELC3521 Professional Communication in English									T,P,M	
AF3625 Engineering Economics						T,P,M	T,P		T,P	T,P
ENG3003 Engineering Management						T	T,P,M	T	T,P,M	
ENG3004 Society and The Engineer						T,P,M	T,P,M	T,P,M	T,P	
Compulsory - Capstone Project										
EIE4433 Honours Project+	T,P,M	T,P,M	T,P,M	T,P,M	T,P,M	T,P,M	T,P		T,P,M	T,P,M
Compulsory - Industrial Centre Training										
IC2114 Industrial Centre Training I for EIE	T,P				T,P			T,P,M		T,P,M
IC382 Multidisciplinary Manufacturing Project			T,P,M		T,P		T,P,M			
Elective - Engineering Subjects (Select Any 4)										
EIE3109 Mobile Systems and Application Development			T,P		T,P					
EIE3112 Database System	T				T				T,P	
EIE3305 Integrated Analogue and Digital Circuits	T,P			T,P,M	T,P		T,P			
EIE3320 Object-Oriented Design and Programming	T		T,P,M	T,P	P		P			
EIE4100 Computer Vision and Pattern Recognition	T	T	T	T	T,P,M		T			T
EIE4102 IP Networks	T				T,P,M	T				T
EIE4103 Mobile Computer System Architecture				T	T,P					T,P,M
EIE4104 Mobile Networking	T			T,P,M	T,P	T				T
EIE4105 Multimodal Human Computer Interaction Technology	T,P				T,P,M					
EIE4106 Network Management and Security	T	T,P	T	T,P,M	T,P			T,P,M	T	T
EIE4108 Distributed Systems and Cloud Computing	T,P		T,P	T	T,P,M				T,P	
EIE4110 Introduction to VLSI and Computer-Aided Circuit Design	T,P	T,P,M		T,P			T,P			
EIE4112 Avionics Systems	T,P,M	T,P,M		T,P	T,P					
EIE4113 Wireless and Mobile Systems	T,P,M	T,P,M			T,P	T,P				
EIE4114 Digital Forensics for Crime Investigation	T,P,M				T,P				T,P	
EIE4115 Intrusion Detection and Prevention	T,P,M	T,P			T,P	T,P		T,P	T,P	

	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
EIE4116 Surveillance Studies and Technologies	T,P,M				T,P			T,P,M		
EIE4402 Power Electronics	T,P,M	T,P,M		T,P			T,P			
EIE4432 Web Systems and Technologies	T		T,P					T,P,M		T,P,M
EIE4435 Image and Audio Processing	T,M	P		P			P			
EIE4449 Optical Communication Systems and Networks	T	T,P	T	T,M			T		T	
ENG4001 Project Management			T,P		T,P				T,P	T,P,M

Note:

Programme Outcomes:

1. Understand the fundamentals of science and engineering, and have the ability to apply them.
2. Design and conduct experiments, as well as to evaluate the outcomes.
3. Design systems, components and processes to meet given specifications and constraints.
4. Identify, formulate and solve problems relevant to EIE.
5. Have the ability to use modern engineering/IT tools appropriate to EIE practice.
6. Have a knowledge of contemporary issues, and understand the impact of engineering solutions in a global and societal context.
7. Be able to work with others collaboratively in a multi-disciplinary team and have a knowledge of leadership.
8. Recognize social, professional and ethical responsibility.
9. Communicate effectively.
10. Recognize the need for and to engage in life-long learning

T: Teach

P: Practise

M: Measured

+: Support of outcomes depends on particular project/subject design and requirements

7. HONOURS PROJECT

The Honours Project is considered to be of great importance. This is reflected in the number of credits it carries, being 6 credits which are equivalent to two standard-sized subjects. Furthermore, the result of the Honours Project will be very important when the Board of Examiners considers the award classification of a student. Normally, the Board of Examiners will expect a very good grade for the Honours Project when a student is to be awarded a high Honours classification.

One of the important features of the Honours Project is “learning by doing”. It is intended to be a platform for the students to develop their intellectual and innovative abilities and to give them the opportunities to integrate and apply the knowledge and analytical skills gained in previous stages of study. It should also provide students with opportunities to develop their problem-solving skills and communication skills. The process from conceptualization to final implementation and testing, through problem identification and the selection of appropriate solutions will be practised by the students.

7.1 Project Management

Normally each student will be assigned one project under the supervision of an academic staff member so that he/she will work independently to achieve the project objectives. In other cases, several students may work on different aspects of a large-scale project.

The assignment of projects is expected to be completed by the month of June preceding the beginning of the final year of study. Guidelines for Honours Project are given to students at the beginning of the final year.

7.2 Project Assessment

Assessment of the Honours Project focuses in three main areas: project reports, oral presentations and work done over the whole project period. Assessment will be done by the project supervisor and an assessor. The Project Management Team, which is composed of the Programme Leader and staff members from teaching sections, will oversee the overall standard of assessment of the projects. The Project Management Team will also oversee the daily operation, such as fixing the dates of project report submission, oral presentation, demonstration, etc.

8. INDUSTRIAL CENTRE TRAINING

Industrial Centre (IC) Training is a practical training element in this curriculum to provide a chance for the students to develop hands-on experience in various engineering domains in order to prepare for a career in the engineering profession.

Students must pass all IC Training subjects in order to be considered for the BEng(Hons) in Electronic and Information Engineering award. IC Training is graded in the normal manner from A+ to F and will be counted in the evaluation of the Grade Point Average (GPA). However, they will not be counted towards Weighted GPA or Award GPA. The assessment method of Industrial Centre Training is based on 100% continuous assessment. The assessment components are workshop reports, competency in practical works, and appreciation tests. To complete the IC Training successfully, students must demonstrate good professional attributes including responsible attitude in training, excellent attendance with active learning, exercising best practice and care in equipment and tools while observing all safety codes. Detail of assessment scheme is available from Industrial Centre.

9. WORK-INTEGRATED EDUCATION (WIE)

9.1 WIE is a mandatory component of the programme. There can be several routes or options for the students to pursue Work-Integrated Education (WIE). These options include the One-year Internship Scheme (OIS), industrial projects and other workplace training opportunities provided by the University or found by students themselves, etc.

9.2 Credits Requirement

In order to graduate from this programme, students must attain a minimum of one WIE training credit within the period of study. Following the Faculty of Engineering's guideline, students will be awarded one WIE training credit for acquiring two weeks' full-time training. WIE training credits will not be counted towards the Grade Point Average (GPA) or the Weighted GPA (WGPA). After assessing the training performance, a Pass or a Fail grade will be awarded to the student on his/her WIE component.

9.3 Intended Learning Outcomes of WIE

Since WIE can take different forms and be applied to different kinds of job, the learning outcomes to be achieved vary depending on the job nature and its duration

engaged by the student. However, based on the experience gained, WIE can bring a lot of advantages to students' learning both in the profession-specific areas and in their all-round development. The intended learning outcomes of WIE are elaborated in the following paragraph.

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

- (i) Apply knowledge and skills learned from the Programme on the job in a broad context of networking and multimedia profession.
- (ii) Recognize the operation and requirement of real-life business, leading to the development of entrepreneurship, global outlook, professional ethics, social and cultural understanding.
- (iii) Recognize the expectation of employers, hence leading to better employability.
- (iv) Develop their all-round attributes such as interpersonal skills and leadership.
- (v) Develop their critical and creative thinking, and problem-solving skills while taking into account various real-life constraints, helping them to pursue life-long learning and continuing professional development.

9.4 WIE Options

WIE component under the Programme can be in many forms, including One-year Internship Scheme (OIS), industrial project and other job opportunities.

9.4.1 One-year Internship Scheme (OIS)

The OIS lasts for 1 year. Under the OIS, the students will pursue Year 1, Year 2 and Year 3 study in full time (or Year 1 for Senior Year Intake), and then engage in industrial training in Year 4 (or Year 2 for Senior Year Intake). After the industrial training year, the students will pursue their final-year study in full time again. Normally the students will graduate at the end of Year 5 (or Year 3 for Senior Year Intake) after having satisfied all programme requirements.

Students who would like to join the OIS are required to submit an application to the Department prior to the commencement of the industrial training. They can choose to take 0 to 8 credits of subject in a semester during the industrial training year. The amount of tuition fee to be paid during the industrial training year will depend on the number of credits taken by the students in a semester.

9.4.2 Industrial Project

Industrial projects are Honours Projects working with the industry. Students working on an industrial project will pursue the project in a company for a certain period. The students will work with a real-life project in the real working environment.

9.4.3 Other Job Opportunities

It is possible that students find jobs for themselves to work during the summer vacation. This kind of job opportunity will be judged by the Department whether it is helpful to the students in achieving the intended learning outcomes of WIE. The students and the Academic Advisor/WIE Coordinators will work collaboratively with regard to the job selection and the subsequent training contents. The Department will constantly monitor the progress. At the end of the training, an assessment will be made on the achievement of learning outcomes.

9.5 Guidelines for Operation and Supervision of WIE

The Department adopts a set of strategies to support students' learning in the workplace. The followings are the details of the operation at different stages.

9.5.1 Preparation

The Department will actively align with the industry to get WIE placement opportunities for students. It is important for students to be fully aware of the benefits brought by WIE. Students will be asked to attend employment seminars as early as possible. Through this type of arrangement, students in all years will be well prepared for job hunting and employment in advance. Students will also be able to realize the benefits for engaging in WIE and the importance of taking an active role in completing the training with the best effort.

9.5.2 Operation

There will be WIE Coordinators overseeing all matters related to WIE activities under the Programme. The WIE Coordinators are the academic staff members of the Department responsible for the organization and operation of WIE activities. To guide the students and monitor their progress in taking the

WIE, each student will be assigned an academic advisor from the Department. The student and his/her Academic Advisor will jointly plan the WIE details, such as job selection, training plan, logging of activities, reporting, and assessment.

In the case that the student finds job placement(s) on his/her own, the Academic Advisor will work with the student to design the learning outcomes if the placement is suitable to be recognized as a WIE activity. The Academic Advisor will make frequent contacts with the student and, if appropriate, the employer to monitor the progress of the student.

Each student will be guided by his/her Academic Advisor when conducting the WIE training. The student's work will be monitored continuously and an assessment will be given when the WIE placement is completed.

9.5.3 Assessment of the WIE Component(s)

The objective of assessment is to determine what the student has achieved through WIE. The actual type of work and duration will vary from case to case. Hence, an assessment framework is set out in the following as a general guideline.

(i) Continuous Assessment

The Academic Advisor may visit the student during the training period so that the Academic Advisor and the employer will be able to discuss the student's performance together. This will give better feedback on the student's performance before the training is completed.

(ii) Report

After the training is completed, the student is required to submit a report to the Academic Advisor. The details to be contained in the report should be commensurate with the training duration. It contains a brief reflective writing on the training received, the objectives that have been achieved, and the experience gained. The student may also conduct a self-evaluation on his/her own performance. The report must be endorsed by the student's employer before its submission.

(iii) Employer Evaluation

At the end of the training period, the employer will provide an evaluation of the student's performance, assessing the student's work and all-round development.

(iv) Overall Assessment

An overall assessment of the student's performance will be made by the Academic Advisor by considering all the assessment components as stated in Section 9.5.3(i)-(iii). A pass grade will be given to the student upon satisfactory completion of the WIE component; otherwise, a failure grade will be given.

10. DEPARTMENTAL UNDERGRADUATE PROGRAMME COMMITTEE

10.1 The composition of the Departmental Undergraduate Programme Committee (DUPC) is decided by the Head of Department. Normally, the DUPC 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.

10.2 The DUPC 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 programme.

11. STUDENT STATUS

11.1 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 programmes enrolled and/or the study load as described in Sections 11.2 to 11.5 below.

Full-time students:

- 11.2 Students enrolling on this programme with a study load of 9 credits or more in a semester are classified as *full-time* students. Students who wish to change their study load to less than 9 credits in a semester will have to seek prior approval from their Department.
- 11.3 Full-time local students enrolled on UGC-funded programmes are eligible to apply for financial assistance from the Government in the form of grant and loan. Government grant and loan may not be granted beyond the normal period of study for the programme.

Self-paced students:

- 11.4 Students who wish to study at their own pace instead of following the specified progression pattern will have to seek prior approval from their Department. These students are referred to as self-paced students.

Subject-based students:

- 11.5 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.

12. SUBJECT REGISTRATION AND WITHDRAWAL

- 12.1 In addition to programme registration, students need to register for subjects at specified periods prior to the commencement of a 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 offering Department). Applications submitted after the commencement of the examination period will not be considered. Once the application of subject withdrawal is approved, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the examination result notification and transcript of studies, but will not be counted in the calculation of the GPA.

- 12.2 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.
- 12.3 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. Students will be allowed to take additional subjects for the following semester for broadening purpose, after they fulfil the graduation requirements. However, they will still be subject to the maximum study load of 21 credits per semester and the availability of places in the subjects concerned. They will enrol as subject-based students only and be subject to the rules on “Admission of Subject-based Students”, except that graduates from UGC-funded programmes will not be restricted to taking only subjects from a self-financed programme.

13. STUDY LOAD

- 13.1 For students following the progression pattern specified for their programme, they have to take the number of credits and subjects, as specified in this Programme Booklet, for each semester. Students cannot drop those subjects assigned by the department unless prior approval has been given by the department.
- 13.2 The normal study load is 15 credits in a semester. The maximum study load to be taken by a student in a semester is 21 credits, unless exceptional approval is given by the Head of the Department. For such cases, students are reminded that the study load approved should not be taken as grounds for academic appeal.
- 13.3 To help improve the academic performance of students on academic probation (the meaning of “academic probation” can be found in Section 21.2.), these students will be required to take a reduced study load in the following semester (Summer Term excluded). The maximum number of credits to be taken in a semester by students on academic probation is 12. If these students have strong reasons to study more credits, they will have to obtain the endorsement/approval of the respective authority:
- (i) study 13 to 15 credits in a semester: endorsement by the Programme Leader and approval by the Departmental Learning and Teaching Committee (DLTC);

- (ii) study 16 to 18 credits in a semester: endorsement by the Programme Leader, the DLTC and the Head of Department, and approval by the Faculty Dean;
- (iii) study more than 18 credits in a semester: endorsement by the Programme Leader, the DLTC and the Head of Department, and approval by QAC(AD).

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

13.5 Students who have obtained approval to pace their studies and students on programmes without any specified progression pattern who wish to take more than the normal load of 15 credits in a semester should seek advice from the Department concerned before the selection of subjects.

14. SUBJECT EXEMPTION

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

15. CREDIT TRANSFER

- 15.1 Students may be given credits for recognised previous studies including mandatory General University Requirements (GUR) subjects; and the credits will be counted towards meeting the requirements for award. 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 information.
- 15.2 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. However, for applications 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.
- 15.3 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. The validity period of credits previously earned is 8 years after the year of attainment.
- 15.4 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. When 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. For students exceptionally admitted to an Articulation Degree or Senior Year curriculum

before 2017/18, which is already a reduced curriculum, they should not be given credit transfer for any required GUR subjects, and they must complete at least 60 credits to be eligible for award. Students admitted to an Articulation Degree or Senior Year curriculum based on qualification more advanced than Associate Degree/Higher Diploma before 2017/18 may be given credit transfer for the required GUR subjects if they had completed comparable components in their earlier studies. These students can take fewer than 60 credits for attaining the award. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 60 credits to be eligible for award.

- 15.5 If the transferred credits are for a PolyU programme accredited by a professional body, the Department concerned should ensure that the transferred credits will also meet the requirement of the relevant professional body.
- 15.6 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 'deducted' credits at admission stage will be counted towards the maximum limit for credit transfer when students apply for further credit transfer after their admission. This also applies to students admitted to an Articulation Degree or Senior Year curriculum when they claim further credit transfer after admission.
- 15.7 Notwithstanding the upper limits stipulated in Section 15.4 above, (and unless professional bodies stipulate otherwise) students may be given more credit transfer than these upper limits (e.g. upon completion of an exchange programme as mentioned in Section 15.8 below), subject to their satisfying the residential requirement.
- 15.8 Credit transfer can be applicable to credits earned by students through studying 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.

- 15.9 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.
- 15.10 Regarding credit transfer for GUR subjects, the Programme Host Department is the approval authority at the time of admission to determine the number of GUR credits which an Advanced Standing student will be required to complete for the award concerned. Programme Host Departments will make reference to the mapping lists of GUR subjects, which are compiled by the Committee on General University Requirements (CoGUR), on the eligibility of the subjects that can be qualified as GUR subjects. Applications for credit transfer of GUR subjects after admission will be considered, on a case-by-case basis, by the Subject Offering Department or Office of General University Requirements (OGUR)/Office of Service Learning (OSL), in consultation with the relevant Sub-committee(s) under CoGUR, as appropriate.
- 15.11 For credit transfer of retaken subjects, the grade attained in the last attempt should be taken in the case of credit transfer with grade being carried over. Students applying for credit transfer for a subject taken in other institutions are required to declare that the subject grade used for claiming credit transfer was attained in the last attempt of the subject in their previous studies. If a student fails in the last attempt of a retaken subject, no credit transfer should be granted, despite the fact that the student may have attained a pass grade for the subject in the earlier attempts.
- 15.12 Students will not be granted credit transfer for a subject which they have attempted and failed in their current study unless the subject was taken by the student as an exchange-out student in his current programme.

16. DEFERMENT OF STUDY

- 16.1 Students may apply for deferment of study if they have a genuine need to do so such as illness or posting to work outside Hong Kong. Approval from the Department offering the programme is required. The deferment period will not be counted towards the maximum period of registration.

- 16.2 Application for deferment of study will be entertained only in exceptional circumstances for students who have not yet completed the first year of a full-time or sandwich programme.
- 16.3 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.
- 16.4 Students who have been approved for deferment are not entitled to enjoy any campus facilities during the deferment period.

17. PRINCIPLES OF ASSESSMENT

- 17.1 Assessment of learning and assessment for learning are both important for assuring the quality of student learning. Assessment of learning is to evaluate whether students have achieved the intended learning outcomes of the subjects that they have taken and have attained the overall learning outcomes of the academic programme at the end of their study at a standard appropriate to the award. Appropriate methods of assessment that align with the intended learning outcomes will be designed for this purpose. The assessment methods will also enable teachers to differentiate students' different levels of performance within subjects. Assessment for learning is to engage students in productive learning activities through purposefully designed assessment tasks.
- 17.2 Assessment will also serve as feedback to students. The assessment criteria and standards will be made explicit to students before the start of the assessment to facilitate student learning, and feedback provided will link to the criteria and standards. Timely feedback will be provided to students so that they are aware of their progress and attainment for the purpose of improvement.
- 17.3 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. Recommendations from Board of Examiners which fall outside these Regulations shall be ratified by the Academic Regulations Committee (ARC) and reported to the Senate.

18. ASSESSMENT METHODS

- 18.1 Students' performance in a subject can be assessed by continuous assessment and/or examination, at the discretion of the individual subject offering Department. Where both continuous assessment and examination are used, the weighting of each in the overall subject grade will be clearly stated in the programme booklet. The subject offering Department can decide whether students are required to pass both the continuous assessment and examination components, or either component only, in order to obtain a subject pass, but this requirement (to pass both, or either components) will be specified in the programme booklet. Learning outcomes should be assessed by continuous assessment and/or examination appropriately, in line with the outcome-based approach.
- 18.2 Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous Assessment Assignments which involve group work should nevertheless include some individual components therein. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately, and this can result in different grades being awarded to students in the same group.
- 18.3 Assessment methods and parameters of subjects shall be determined by the subject offering department.
- 18.4 At the beginning of each semester, the subject teacher will inform students of the details of the methods of assessments to be used within the assessment framework as specified in the programme booklet.

19. SUBJECT RESULTS

- 19.1 Subject Lecturers, in respect of the subject they teach, have sole responsibilities for marking and grading students' coursework and examinations scripts. Timely feedback of continuous assessment will be given to students as soon as possible (e.g. not later than a month), and in any case, before the final examination/assessment. In this regard, Subject Lecturers will be accountable to the Head of the subject offering Department, to ensure that all forms of assessment, including the students' coursework and examination scripts, are correctly marked and graded where appropriate. Subject Lecturers will avoid administrative errors at all times, and submit the grades for finalisation by Subject Assessment Review Panel (SARP) according to the schedule of the Department. To ensure consistency and uniformity for a common subject taught by

different Subject Lecturers, meetings can be arranged amongst them before the examination papers are set or before the marking is done.

- 19.2 Subject grades will be reviewed and finalised by SARP before being formally released to students and submitted to the Board of Examiners. Each Department forms one or several SARPs to take care of the subjects it offers. The Board of Examiners will not attempt to change any grades.
- 19.3 SARP(s) shall be formed by the Head of the Department offering the subjects. It shall include the Head of the Department offering the subject as the Chairman, the relevant subject examiners and where appropriate, and the Programme Leader.

20. BOARD OF EXAMINERS (BoE)

- 20.1 The authority for approving the overall results of students rests with the Board of Examiners (BoE). The BoE will meet at the end of each semester (except for Summer Term unless there are students who are eligible to graduate after the 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.
- 20.2 These decisions are made by the 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 students' performance on the programme in previous years, the general assessment regulations of the University, the specific programme regulations, and good practice established in the University and elsewhere.
- 20.3 The BoE will not attempt to change the grades for any student in any subject nor condone failures. The 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.
- 20.4 Any decisions by the BoE outside the General Assessment Regulations of the University, supported by the Faculty Board, shall be referred to the Academic Regulations Committee 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.

- 20.5 Students shall be formally notified of decisions affecting them after the BoE meeting except for those whose cases require ratification of the Faculty Board. For the latter cases, 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 Academic Regulations Committee ratifies that decision. Any prior communication of results to these students shall be subject to formal ratification.

21. PROGRESSION / ACADEMIC PROBATION / DEREGISTRATION

- 21.1 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 or the Summer Term study is mandatory for the programme)), 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.
- 21.2 When a student has a Grade Point Average (GPA) (see Section 25.3 below) lower than 2.0, he/she will be put on academic probation in the following semester. If a student is able to pull his/her GPA up to 2.0 or above at the end of that following semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in the transcript of studies.
- 21.3 A student will have 'progressing' status unless he/she falls within any one of the following categories, 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/her 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.

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

- 21.4 The progression of students to the following academic year will not be affected by the GPA obtained in the Summer Term, unless Summer Term study is mandatory for all students of the programme and constitutes a requirement for graduation, and is so specified in this programme booklet.
- 21.5 A student may be de-registered from the programme enrolled before the time frame specified in Sections 21.3(ii) or 21.3(iii) above if his/her academic performance is poor to the extent that the Board of Examiners deems that his/her chance of attaining a GPA of 2.0 at the end of the programme is slim or impossible.
- 21.6 If the student is not satisfied with the de-registration decision of the Board of Examiners, he/she can lodge an appeal. All such appeal cases will be referred directly to Academic Appeals Committee (AAC) for final decision. Views of Faculties/Schools/Departments will be sought and made available to AAC for reference.

22. APPEAL AGAINST ASSESSMENT RESULTS

A student may appeal against a decision on their assessment results or the decision on deregistration upon the public announcement of the overall results. The procedures for appeals against examination results are detailed in the Student Handbook.

23. RETAKING OF SUBJECTS

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

- 23.3 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. Likewise, students who fail a Cluster Area Requirement (CAR) subject may take another subject from the same Cluster Area in order to fulfill this part of the GUR, since the original CAR subject may not be offered at a particular time. In such cases, the fail grade for the first CAR subject will be taken into account in the calculation of the GPA, despite the passing of the second CAR subject. However, if students do not have a choice to retake a failed subject, such as when the failed subject has been phased out, a 'tie-subject' arrangement can be made with the approval of the Faculty/School Board. Under the arrangement, another appropriate subject can be taken as equivalent to the subject which is not offered. Upon passing the equivalent subject, the fail grade of the original subject will be replaced by the latest grade of the retake subject and the failure grade of the original subject will not be taken into account in the calculation of the GPA.

24. EXCEPTIONAL CIRCUMSTANCES

Absence from an assessment component

- 24.1.1 If a student is unable to complete all the assessment components of a subject, due to illness or other circumstances which are beyond his/her control and considered by the subject offering Department as legitimate, the Department will determine whether the student will have to complete a late assessment and, if so, by what means. This late assessment shall take place at the earliest opportunity, and before the commencement of the following academic year (except that for Summer Term, which may take place within 3 weeks after the finalisation of Summer Term results). If the late assessment cannot be completed before the commencement of the following academic year, the Faculty/School Board Chairman shall decide on an appropriate time for completing the late assessment.
- 24.1.2 The student concerned is required to submit his/her application for late assessment in writing to the Head of Department offering the subject, within five working days from the date of the examination, together with any supporting documents. Approval of applications for late assessment and the means for such late assessments shall be given by the Head of Department offering the subject or the Subject Lecturer concerned, in consultation with the Programme Leader.

Assessment to be completed

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

Aegrotat award

- 24.3 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/her 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.
- 24.4 A student who has been offered an aegrotat award shall have the right to either 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.
- 24.5 The acceptance of an aegrotat award by a student shall disqualify him/her from any subsequent assessment for the same award.
- 24.6 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

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

25. GRADING

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

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.

25.2 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

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

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

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

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

- (i) Exempted subjects
- (ii) Ungraded subjects
- (iii) Incomplete subjects
- (iv) Subjects for which credit transfer has been approved, but without any grade assigned (Subjects taken in PolyU or elsewhere and with grades assigned, and for which credit transfer has been approved, will be included in the GPA calculation.)
- (v) Subjects from which a student has been allowed to withdraw (i.e. those with the code 'W')

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

25.4 Different types of GPA's

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

- 25.4.2 The GPA calculated after the second Semester of the students' study is therefore a 'cumulative' GPA of all the subjects taken so far by students, and without applying any level weighting.
- 25.4.3 Along with the 'cumulative' GPA, a weighted GPA will also be calculated, to give an indication to the Board of Examiners on the award classification a student will likely get if he/she makes steady progress on his/her academic studies. GUR subjects will be included in the calculation of weighted GPA for all programmes.
- 25.4.4 When a student has satisfied the requirements for award, an award GPA will be calculated to determine his/her award classification. GUR subjects will be included in the calculation of award GPA for all programmes.
- 25.4.5 For students taking the Major/Minor study route, a separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his/her award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for the Board of Examiners to moderate the award classification for the Major, as explained further in Section 27.13.
- 25.4.6 The relationship between the different types of GPA's, and the methods for calculating each, is further explained in Appendix 1.

26. GRADUATION REQUIREMENTS FOR BENG(HONS) IN ELECTRONIC AND INFORMATION ENGINEERING PROGRAMME

All students qualifying for a 4-year Full-time Undergraduate Degree offered from 2018/19 onward for must meet:

- (i) the University Graduation Requirements, as explained in Section 26.1 below; and
- (ii) the specific graduation requirements of their chosen programme of study (Majors and Minors), as stated in Section 26.2 below.

26.1 University Graduation Requirements

26.1.1 Normal Year 1 Intake:

- (i) Satisfy the following requirements in general education (GUR):
 - (a) 9 credits of Language and Communication Requirements (LCR) as set out in Section 4.2^{Note 1}.
 - (b) 3 credits of Freshman Seminar.
 - (c) 3 credits of Leadership and Intra-Personal Development.
 - (d) 3 credits of Service-Learning.
 - (e) 12 credits of Cluster Areas Requirement (CAR).
 - (f) 3 of the 12 CAR credits being designated as “China-related” (China Studies Requirement).
 - (g) Healthy Lifestyle ^{Note 2}.
- (ii) Earn a cumulative GPA of 2.00 or above at graduation.
- (iii) Obtain at least 1 WIE credit as set out in Section 9.2.
- (iv) Satisfy the residential requirement for at least 1/3 of the credits to be completed for the award the student is currently enrolled, unless the professional bodies stipulate otherwise.

26.1.2 Senior Year Intake:

- (i) Satisfy the following requirements in general education (GUR):
 - (a) 3 credits of Service-Learning.
 - (b) 6 credits of Cluster Areas Requirement (CAR) from two different cluster areas.
 - (c) 3 of the 6 CAR credits being designated as “China-related” (China Studies Requirement.)
 - (d) Fulfilment of the English and Chinese reading and writing requirements

in CAR subjects.

- (e) Having met the equivalent standard of the Undergraduate Degree Language and Communication Requirements (LCR) as set out in Section 4.2 ^{Note 1}.
- (ii) Earn a cumulative GPA of 2.00 or above at graduation.
- (iii) Obtain at least 1 WIE credit as set out in Section 9.2.
- (iv) Satisfy the residential requirement for at least 1/3 of the credits to be completed for the award the student is currently enrolled, unless the professional bodies stipulate otherwise.

Further details about the University Graduation Requirements can be found in Appendix 2.

Note 1: Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements. However, this group of students would still be required to take one Chinese LCR subject to fulfil their Chinese LCR.

Note 2: Students admitted to the programmes as Senior Year Intakes are not required to take the Healthy Lifestyle Programme. Advanced Standing students are required to take Healthy Lifestyle (except for those who are HD/AD holders who follow the Senior Year/Articulation Degree programme GUR curriculum).

26.2 Specific Graduation Requirements for the **BEng(Hons) in Electronic and Information Engineering** Programme

26.2.1 Normal Year 1 Intake:

- (i) Complete successfully a minimum of 124 academic credits composed of the following:
 - (a) 30 credits of General University Requirements (GUR) as set out in Section 26.1.1(i).
 - (b) 94 credits of Discipline-Specific Requirements (DSR), of which 82 credits from subjects categorized as COM (compulsory) and 12 credits from subjects categorized as ELE (elective) (at least 2 of these electives must be at level 4 or above) as stated in Table 4.1.
- (ii) Obtain a total 8 credits in TRN (Training) as stated in Table 4.1.
- (iii) Satisfy the residential requirement for at least 1/3 of the credits to be completed for the award the student is currently enrolled, unless the professional bodies stipulate otherwise.
- (iv) In addition to the minimum 124 academic credits, HKDSE students who do not

have Level 2 or above in HKDSE Physics or Combined Science with Physics, and non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities are required to study 3 more credits on Physics in order to graduate. They have to complete a minimum of 127 academic credits in order to be eligible for graduation.

26.2.2 Senior Year Intake:

- (i) Complete successfully a minimum of 67 academic credits composed of the following:
 - (a) 9 credits of General University Requirements (GUR) as set out in Section 26.1.2 (i).
 - (b) 58 credits of Discipline-Specific Requirements (DSR), of which 46 credits from subjects categorized as COM (compulsory) and 12 credits from subjects categorized as ELE (elective) (at least 2 of these electives must be at level 4 or above) as stated in Table 4.1.
- (ii) Obtain a total 8 credits in TRN (Training) as stated in Table 4.1.
- (iii) Satisfy the residential requirement for at least 1/3 of the credits to be completed for the award the student is currently enrolled, unless the professional bodies stipulate otherwise.

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

26.4 In addition, students may be required to take subjects that are designed to enhance their skills in particular subject areas to underpin their further advanced study in the discipline. These underpinning subjects could be of different subject areas (e.g. Mathematics, science subjects), and the number of credits each student is required to take in a particular underpinning subject area may vary according to the different academic backgrounds of the students. With effect from the 2015/16 intake cohort, the regular credit requirement for award will count the lowest number of credits taken by the students in the same subject area.

26.5 Senior Year intakes admitted to the 4-year Undergraduate Degree programmes on the strength of the Associate Degree/Higher Diploma qualifications are required to complete at least 60 credits in order to be eligible for a Bachelor's degree. Exemption may be given from subjects already taken in the previous Associate Degree/Higher

Diploma studies. In that case, students should take other electives (including free electives) instead to make up the total of 60 credits required. For students who are exceptionally admitted before 2017/18 on the basis of academic qualification(s) more advanced than Associate Degree/Higher Diploma, such as the advanced stage of a 4-year degree curriculum programme, Departments can continue to grant credit transfer as appropriate to give recognition to the advanced study taken. These students can take fewer than 60 credits for attaining the award. The proportion of these students should remain low. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 60 credits to be eligible for award.

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

26.7 Students Taking the Major/Minor Option

The credit requirement for a Minor is 18 with at least 50% (9 credits) of the subjects at Level 3 or above. Students taking the Major/Minor option will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 2.0 or above) and have submitted an application for graduation. If the 18 credits taken for the approved Minor study can meet the requirements for that Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. Otherwise, students will graduate with a Major only. Subject to approval by the Minor-offering department, students may count up to 6 credits from their Major/GUR (including LCR subjects at proficient level) towards their chosen Minor. Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major/Minor studies must not be lower than the credit requirement of the single discipline Major programme.

- 26.8 A student is required to graduate as soon as he/she satisfies the graduation requirements as stipulated in Sections 26.1, 26.2, 26.6 and 26.7 above. The student concerned is required to apply for graduation, in the semester in which he/she is able to fulfil all his/her graduation requirements, and after the add/drop period for that semester has ended.

27. GUIDELINES FOR AWARD CLASSIFICATION

- 27.1 The guidelines for award classification of BEng(Hons) in Electronic and Information Engineering award 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.
- 27.2 This Programme uses Weighted GPA as a guide for helping to determine award classifications. A University-wide standard weighting are applied to all subjects of the same level, with a weighting of 2 for Level 1 and 2 subjects, a weighting of 3 for Level 3, 4 and 5 subjects.

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 $W_i = 2$ for all Level 1 and Level 2 subjects, and

$W_i = 3$ for all Level 3, Level 4 and Level 5 subjects.

n = number of subjects counted towards the award as listed in Table 4.1 according to the Specified Progression Pattern (Section 5) (inclusive of failed subjects) taken by the student up to and including the latest semester. (For subjects that have been retaken, only the grade obtained in the final attempt will be included in the GPA calculation except those exclusions specified in Section 27.3.)

Same as GPA, Weighted GPA is capped at 4.0.

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

- 27.4 The followings are guidelines for the Board for Examiners' reference in determining award classifications:

Honours Degrees	Guidelines
1 st	The student's performance/attainment is outstanding, and identifies him/her as exceptionally able in the field covered by the programme in question.
2 nd (Division I)	The student has reached a standard of performance/attainment which is more than satisfactory but less than outstanding.
2 nd (Division II)	The student has reached a standard of performance/attainment judged to be satisfactory, and clearly higher than the 'essential minimum' required for graduation.
3 rd	The student has attained the 'essential minimum' required for graduation at a standard ranging from just adequate to just satisfactory.

- 27.5 Under exceptional circumstances, a student who has completed an Honours degree programme, but has not attained Honours standard, may be awarded a Pass-without-Honours degree. A Pass-without-Honours degree award will be recommended, when the student has demonstrated a level of final attainment which is below the 'essential minimum' required for graduation with Honours from the programme in question, but has nonetheless covered the prescribed work of the programme in an adequate fashion while failing to show sufficient evidence of the expected intellectual calibre of Honours degree graduates. For example, if a student in an Honours degree programme has a Grade Point Average (GPA) of 2.0 or more, but his/her Weighted GPA is less than 2.0, he/she may be considered for a Pass-without-Honours classification. A Pass-without-Honours is an unclassified award, but the award parchment will not include this specification.
- 27.6 Students who have committed academic dishonesty will be subject to the penalty of lowering the award classification by one level. For undergraduate students who should be awarded a Third class Honours degree, they will be downgraded to a Pass-without-Honours. The minimum of downgraded overall result will be kept at a Pass. In rare circumstances where both the Student Discipline Committee and Board of Examiners of a Department consider that there are strong justifications showing the offence be less serious, the requirement for lowering the award classification can be waived.

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

Honours Classification	Weighted GPA
1 st	3.7 ⁺ - 4
2 nd (Division I)	3.2 ⁺ - 3.7 ⁻
2 nd (Division II)	2.3 ⁺ - 3.2 ⁻
3 rd	2.0 - 2.3 ⁻

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

- 27.8 There is no requirement for the Board of Examiners to produce an award list which conforms to the guidelines in Section 27.7 above.

Students Taking the Major/Minor Studies:

- 27.9 For students who have completed a Major/Minor programme, a single classification will be awarded and their award classification will mainly be based on the "Major GPA", but it can be moderated by the Board of Examiners with reference to the "Minor GPA". For students who have completed a Major programme combined with free electives, their award classification will be determined by their "Major GPA" which includes grades obtained for the free electives, if appropriate.
- 27.10 "Major GPA" is derived based on all subjects of the Major programme, including those meeting the mandatory General University Requirements (GUR) and programme-specific language requirement, but not necessarily including the training credits.
- 27.11 "Minor GPA" is derived based on the 18 credits of the specific Minor programme. Minor GPA is unweighted.
- 27.12 The "Major GPA" and the "Minor GPA" will be presented separately to the Board of Examiners for consideration. The guidelines for determining award classification as stipulated in Sections 27.1 to 27.8 above are applicable to programmes with Major/Minor studies.
- 27.13 Where a student has a high GPA for his/her Major but a low GPA for his/her Minor, he/she will not be 'penalised' in respect of his/her award classification, which is attached to the Major. On the other hand, if a student has a lower GPA for his/her Major than

his/her GPA for the Minor, the Board of Examiners may consider giving the student a higher award classification than that with reference to his/her Major GPA.

28. RECORDING OF DISCIPLINARY ACTIONS IN STUDENTS' RECORDS

- 28.1 With effect from Semester One of 2015/16, disciplinary actions against students' misconducts will be recorded in students' records.
- 28.2 Students who are found guilty of academic dishonesty will be subject to the penalty of having the subject result concerned disqualified, and be given a failure grade with a remark denoting 'Disqualification of result due to academic dishonesty'. The remark will be shown in the students' record as well as the assessment result notification and transcript of studies, until their leaving the University.
- 28.3 Students who have committed disciplinary offences (covering both academic and non-academic related matters) will be put on 'disciplinary probation'. The status of 'disciplinary probation' will be shown in the students' record as well as the assessment result notification, transcript of studies and testimonial during the probation period. The disciplinary probation is normally one year unless otherwise decided by the Student Discipline Committee.
- 28.4 The University reserves the right to withhold the issuance of any certificate of study to a student who has unsettled matters with the University, or who is subject to disciplinary action.

29. SYLLABI

(Please see pages 57 to 271.)

APPENDIX

(Please see pages 272 to 279.)

Subject Description Form

Subject Code	ABCT1101
Subject Title	Introductory Life Science
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	In this subject, students will be introduced to the very basic background knowledge and concepts in biology, together with some recent advances in biotechnology. The main aim of this subject is to arouse students' interest in biological developments so that they can appreciate the impact of biotechnology.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Have a basic understanding of the biological world 2. Appreciate the importance of the biological world to human 3. Appreciate the recent biotechnological advancement and their impacts
Subject Synopsis/ Indicative Syllabus	Syllabus: <u>The basics of life forms: (6 hours)</u> (1) The different forms of biological organisms, i.e. Viruses, Bacteria, Protozoa, Algae, Fungi, Plants, Animals (2) The involvement of these different organisms in our daily life and the importance of ecology and biodiversity. <u>The organization and functions of complex biological organisms: (6 hours)</u> (1) The structure and functions of plants and the importance of plants (2) The structure and functions of animals – human as an example (3) Organization of tissues, organs and functional systems in human <u>The cell: (6 hours)</u> (1) The building blocks of biological organisms (2) Structure and functions of Subcellular organelles (3) Different types of cells (4) Cell division and proliferation <u>The heredity: (6 hours)</u> (1) The genetic material; General structure of DNA and RNA (2) The genetic information in the form of genes (3) Expression of genetic information (4) Passing of genetic information to offspring <u>Modern biotechnology: (6 hours)</u> (1) Major developments: <i>In vitro</i> fertilization; Gene cloning; GM foods; GM organisms; Human genome project; Gene therapy; Stem cell therapy; Human cloning (2) Impacts of biotechnology on our life and the environment (3) Ethical, social and legal issues
Teaching/Learning Methodology	In the lectures, the basic concepts and knowledge will be delivered to the students. These knowledge and concepts will be further enhanced through tutorial exercises, discussions and debates during tutorials, and through assessments.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
			1	2	3
	1. Written assessment I	15%	✓	✓	
	2. Written assessment II	20%	✓	✓	
	3. Written assignment	15%	✓	✓	✓
	4. End of subject exam	50%	✓	✓	✓
	Total	100%			
	Each student will be required to read broadly and to complete a written assignment in which an understanding of some of the major concepts and knowledge has to be demonstrated. In this written assignment, a student will also need to express his/her critical evaluation of the impacts of a new development in biotechnology. This assignment will be in the form of a critical review essay.				
	A student will also need to take two tests (Written assessments I & II) which will gauge their learning outcomes at two separate stages of the subject. These assessments will also allow students to get feedbacks on their performance and how well they are achieving the learning outcomes.				
	There will also be an end of subject assessment which will assess all of the four learning outcomes. This will most likely be in the form of an examination.				
Student Study Effort Expected	Class contact:				
	• Lectures		34 Hours		
	• Tutorials		5 Hours		
	Other student study effort:				
	• Self Study		80 Hours		
	Total student study effort		119 Hours		
Reading List and References	1. Eric J. Simon, Jean L. Dickey, Jane B. Reece, <i>Campbell Essential Biology with Physiology</i> Fifth Edition, Pearson 2014				
Last Updated	July 2016				
Prepared by	ABCT Department				

Subject Description Form

Subject Code	ABCT1301
Subject Title	Chemistry and Modern Living
Credit Value	3
Level	1
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	This subject aims to provide opportunities for students to develop and use chemical concepts and skills, so that the students would understand the chemistry behind some issues and problems that may arise within the community.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Realize the importance of chemical science and technology in our everyday life 2. Appreciate the benefits and shortfalls of technology 3. Analyze critically current issues in modern technology, including issues in environment, renewable energy, new materials etc. Please explain how the stated learning outcomes relate to the following three essential features of GUR subjects: Literacy, Higher order thinking, and Skills for life-long learning <u>Literacy:</u> The students are required to read some assigned materials (e.g. news articles, general science literature) before the lectures as a preparation of the lecture topics. A few questions will be raised for each reading materials to help the students to think about the context before the lectures. [Outcomes (1), (2), and (3)] <u>Higher order thinking:</u> This subject is a broad introduction to Chemistry as a way of thinking and knowing. This subject will present key chemical principles on need-to-know basis within a context of modern living. The students will develop these concepts and principles in the lectures, tutorials and laboratory classes. A student completing this subject ought to be empowered by the way of thinking rationally and make judgment based on evidence; and be able to apply it throughout life. [Outcomes (1) (2) and (3)] <u>Life-long learning:</u> Making rational judgment will be an emphasis of this course and students are expected to keep a journal with entries stimulated by the questions after the lectures. Some of the questions will be directed to reflection on whether systematic observations, scientific reasoning and rational judgment are being applied in their own decision making processes in scenarios related to their academic study, career development and personal issues. Students are required to organize into groups to prepare a presentation on selected topics with individual report. Literature survey techniques will be introduced to help students identify information and access the credibility of the text based on whether the evidence are supported by experimental data. [Outcomes (1), (2) and (3)]

Subject Synopsis/ Indicative Syllabus	Topics	Contact Hours																																		
	The nature of matter – elements, compounds and mixtures; atoms and molecules	4																																		
	Periodic Table and Chemical Bonding	6																																		
	Modern materials –plastics	4																																		
	Chemistry of Air: Acid rain, ozone hole and global warming	4																																		
	Energy for Today and Tomorrow	6																																		
	Chemistry of Water: Water treatment and recycling	4																																		
	Chemistry in Health and Medicine	6																																		
	Chemistry of Food																																			
	Chemistry that keep you beautiful and clean	4																																		
Teaching/Learning Methodology	<u>Lectures</u>: This is the major teaching method used in this subject. A few questions will be asked for each reading materials to help the students think about the context before the lectures. <u>Tutorials</u>: Tutorials will be a venue to engage students in active learning processes through discussing of some chemistry-related issues reported in the newspapers. Students formed groups of four to six students to discuss and express their opinions on some specific questions by invoking the principles and concepts learnt from earlier classes. It is aimed to develop the problem-solving skills of the students with real-world problems. In later stage, each group will be assigned a topic for literature survey and presentation in the tutorial. <u>Laboratory</u>: Chemistry is an experimental science and it is the best way to know the subject. Selected simple and interesting experiments will be conducted by students in groups of two to three. The laboratory allows students to have experiences on collecting data and think about the reliability, accuracy and discuss how to make conclusion from the data. The students are required to submit simple reports as a way to record their observation systematically. This set a good example on making rational decisions based on observations and evidences. <u>Individual Study</u>: Students will be expected to spend two to three hours on reading outside the classroom. Questions will be given to prepare the students on the issues discussed. Since this may be an area of weakness for Hong Kong students, clear guidelines and checks will be in place to ensure that it occurs. Students are required to keep the answers of the questions in a reflective journal which will be collected a few times and marked. The emphasis in this subject on reading comprehension is designed to give the student an essential experience of empowerment in learning to study effectively.																																			
Assessment Methods in Alignment with Intended Learning Outcomes	<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>1. Quiz</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Laboratory work</td><td>20%</td><td>✓</td><td></td><td></td></tr><tr><td>3. Group presentation</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>4. Assignment/ Reading Exercise</td><td>10 %</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100 %</td><td></td><td></td><td></td></tr></table>			Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			1	2	3	1. Quiz	40%	✓	✓	✓	2. Laboratory work	20%	✓			3. Group presentation	30%	✓	✓	✓	4. Assignment/ Reading Exercise	10 %	✓	✓	✓	Total	100 %			
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4. Assignment/ Reading Exercise	10 %	✓	✓	✓																																
Total	100 %																																			

Student Study Effort Excepted	Class contact:	
	• Lecture	26 Hours
	• Tutorial	13 Hours
	• Laboratory	9 Hours
	Other student study effort (laboratory work, presentation):	
	• Preparing presentation and literature report	16 Hours
	• Self study	45 – 70 Hours
	Total student study effort:	109 – 134 Hours
Reading List and References	1. Lecture notes and supplementary materials (for some special topics) will be given. 2. A website where students would find some general information on the relevance of chemistry to modern living are available: http://www.chemistryquestion.com/ 3. Chemistry in Context, Applying Chemistry to Society; 5th edition (A Project by American Chemical Society) Lucy Pryde Eubanks, Cathy Middlecamp, Norbert J. Pienta, Carl E. Heltzel, Gabriela C.Weaver, McGraw Hill, ISBN 0-07-282835-8 4. On Food and Cooking <i>The Science and Lore of the Kitchen</i>, Revised Edition 2004, Harold McGee, Scribner, ISBN 0-684-80001-2	
Last Updated	July 2016	
Prepared by	ABCT Department	

Subject Description Form

Subject Code	ABCT1303
Subject Title	Biotechnology and Human Health
Credit Value	3
Level	1
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	This subject aims to provide the students a general scientific understanding of modern major biotechnology achievements, as well as the impact of biotechnology on our society and ways of living in the context of its application to human health and disease treatment. Beginning with an introduction to the basic principles of life, emphasis is placed on using real-world examples to illustrate the close link between biotechnology and everyday living; its significant contribution to modern health care including special consideration to situations in Hong Kong and China; as well as the social and economical impact of biotechnology on human societies.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Understand the scientific basis of modern biotechnology development; 2. Appreciate the application of biotechnology to human health and diseases; 3. Acquire an analytical and critical mind through a process of questioning and problem solving. <i>Please explain how the stated learning outcomes relate to the following three essential features of GUR subjects: Literacy, Higher order thinking, and Life-long learning</i> Advancement in biotechnology has greatly improved human health and living in the past century. The wide-spread application of biotechnology to modern health care has brought this technically advanced subject into close contact with all of us. Furthermore, the emergence of new diseases like SARS and swine flu; or biotech breakthroughs such as animal cloning stirs up intense public interest and anxiety. A well informed understanding of the scientific basics of biotechnology, as well as its application and impact to modern health care would facilitate the students to achieve better knowledge of healthy living and modern medicine. This subject will employ case studies as an effective learning method. Topics of high public interest and social impact, such as SARS, swine flu, cancer and human cloning etc., will be discussed in terms of both scientific fundamentals as well as biotech innovations. These studies will help the students to achieve a better understanding of such key issues relevant to our healthy living. <u>Higher order thinking</u> Our subject would also be beneficial for higher order thinking. Through case-based studies of examples of biotech, students will learn to apply basic scientific principles to emerging and pressing issues in public health and modern medicine, to formulate well-informed and sound judgment. Students will be encouraged to apply the background knowledge of biotechnology obtained to discuss controversial issues like the societal needs for genetically-engineered plants, use of embryonic stem cells for research purposes etc. <u>Life-long learning</u> Our subject would be beneficial for life-long learning. The rapid development and growth in biotech industry is poised to bring in ground-breaking discoveries that will exert huge impact on our society and transform our ways of living in

	the future. Our subject would provide students with the fundamental and basic scientific knowledge, as well as the higher-order thinking to effectively handle future challenges. <u>Literacy</u> In addition to lecture notes, students are expected to read textbooks after lectures. In addition to textbooks, we will also encourage students to read other articles obtained from newspaper, magazines and even from the web. The idea is to arouse students' interest in the subject matter. Students are expected to write an essay of 400-800 words based on a topic they choose.
Subject Synopsis/ Indicative Syllabus	<u>The Development of Modern Biotechnology (2 hours)</u> • Brief history and different areas of biotechnology • The impact of biotechnology on society <u>Fundamental Principles of Life (2 hours)</u> • Cell structure and flow of genetic information • Cell metabolism, growth and development <u>Gene Biotechnology (4 hours)</u> • Techniques for analyzing DNA • Human Genome Project • Genetic engineering and gene therapy <u>Protein Biotechnology (4 hours)</u> • Diverse uses of proteins as biotechnology products • Protein engineering for therapeutic uses <u>Virus and Immuno Biotechnology (4 hours)</u> • Virus and infectious diseases • Antibodies and vaccines <u>Microbial Biotechnology (3 hours)</u> • Microbial infection and antibiotics • Yeast and fermentation <u>Animal Biotechnology (4 hours)</u> • Genetically modified animals as disease models • Embryos, clones and animal cloning • Transgenic animal and its application <u>Medical Biotechnology (4 hours)</u> • Medical detection and diagnosis • Drug discovery through modern biotechnology • Stem cell technology and regenerative medicine <u>Green Biotechnology (4 hours)</u> • Transgenic plants and biotechnology in agriculture • Green energy and biofuels <u>The Biotechnology Industry (2 hours)</u> • Economics; ethics and regulation • Future strategies and challenges
Teaching/Learning Methodology	Lectures: Lectures will be used to deliver the background knowledge including the basic knowledge of life, cells, proteins and DNA. These background knowledge will be necessary for more advanced topics in the latter part of the subject. We will use a lot of examples to illustrate the importance of biotechnology. This is critical to arouse the interest of students to learn this subject. Lectures will provide students with a detailed understanding of the topics commonly heard/seen in the media.

	Tutorials: Exercises will be provided before or during tutorials. Students are expected to actively participate in the discussions during tutorials. Materials will be given prior to the tutorials to the students to encourage more active participations during tutorials. We will also assess the student presentations. Laboratory works: practicals involving the handling of useful microbes, DNA and protein preparation/analysis. This is to keep students interested in the subject matter. In addition, we will also want the students to learn how science is investigated. Such kind of scientific thinking is one of the important topics we wish our students to be able to learn. Self-study: Students will be given a reading list for their own self-study. Reading list will be extracted from the textbook used. Writing assignment: an essay with 400-800 words will be graded by the teaching staff.																																					
Assessment Methods in Alignment with Intended Learning Outcomes	<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>1. Quiz</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Laboratory work</td><td>20%</td><td>✓</td><td></td><td></td></tr><tr><td>3. Presentation</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>4. Written assignment</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr></table>					Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			1	2	3	1. Quiz	40%	✓	✓	✓	2. Laboratory work	20%	✓			3. Presentation	20%	✓	✓	✓	4. Written assignment	20%	✓	✓	✓	Total	100 %			
Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)																																				
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	Other student study effort:																																					
	• Laboratory work		6 Hours																																			
	• Self study		50 Hours																																			
	Total student study effort:		95 Hours																																			
Reading List and Reference	Textbooks: 1. W.J. Thieman and M.A. Palladino; <i>Introduction to Biotechnology</i>, 2nd ed., Pearson-Benjamin Cummings 2009. 2. R. Renneberg; <i>Biotechnology for Beginners</i>, Academic Press 2008.																																					
Last Updated	July 2016																																					
Prepared by	ABCT Department																																					

Subject Description Form

Subject Code	ABCT1314
Subject Title	Chemistry and Sustainable Development
Credit Value	3
Level	1
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	This subject offers a chemistry perspective to understand current environmental issues. Key chemical principles involved will be introduced. The upsides and downsides of technology and the impact to our lifestyle will be evaluated critically.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Read with greater comprehension on issues related to Chemistry and Environmental issues 2. Identify the achievements of Chemistry in modern lifestyle 3. Identify impacts of human activities on the environment 4. Develop rational judgment on responsible, safe use of chemistry, and hence, a responsible life style 5. Study and work more effectively in small teams. 6. Communicate scientific argument effectively, Please explain how the stated learning outcomes relate to the following three essential features of GUR subjects: Literacy, Higher order thinking, and Skills for life-long learning <u>Literacy:</u> Reading materials and news will be assigned from the textbook before lectures for students to read as a preparation of the lecture topics. The students are also required to read through one of Textbooks listed in this document. A few questions will be asked for each reading materials to help the students to think about the context before they read the materials as a preparation. [Outcomes (1), (2), (3) and (5)]. Student is also required to write a long essay with more than 1,500 words on selected topics related to course contents. <u>Higher order thinking:</u> This subject is a broad introduction to science as a way of thinking and knowing. Chemistry or the use of new chemicals and materials are the basis of human civilization and technological innovations. This development and the impacts of the use of chemicals serve as a good example on the importance of scientific methods in a study to provide evidence for sound conclusions. Tutorials will be used to guide them to complete their essays. During the preparation of the essay, based on the background materials in the textbook, students are required to prepare an outline of issues to be addressed in their essays. Then, they need to perform literature survey to look for evidences and data supporting their arguments. A student completing this subject ought to be empowered by the way of thinking rationally and make judgment based on evidence; and be able to apply it throughout life. [Outcomes (2), (3), (4) and (5)] <u>Life-long learning:</u> Making rational judgment will be an emphasis of this course and students are expect to keep a journal with entries stimulated by questions after the lecture. Some of the questions will be directed to reflection on whether systematic observations, scientific reasoning and rational judgment are being applied in their own decision making processes in scenarios related to their academic study, career development and personal issues. Students are required to organize into groups to prepare a presentation on selected topics with individual report. Literature survey techniques will be introduced to help

	students to identify information and access the credibility of the text based on whether the evidence are supported by experimental data. [Outcomes (4) and (6)]
Subject Synopsis/ Indicative Syllabus	<u>What the weather forecast never tells you: Acid Rain and Global Warming</u> • Combustion and the major sources of energy • Global Warming and green house gases • Kyoto protocol in the political arena • Acid rain and environmental concerns <u>Burn! Let it burn...</u> • Renewable energy sources • Solar Energy • Biofuels and other alternatives <u>Water – Scarcity of the abundant</u> • Water and our health • What do we mean by clean water? • Ions in water and the concept of pH, conductivities • Water cycle – water purification in nature • Water treatment in Hong Kong and common water purification technology <u>Look! There is a hole in the sky</u> • Structure of the earth atmosphere • Effects on ozone layer depletion and ozone hole • Problems arise from the use of halogenated hydrocarbons (a type of refrigerant). • Ozone-friendly materials
Teaching/Learning Methodology	<u>Lectures:</u> This is the major teaching method used in this subject. A few questions will be asked for each reading materials to help the students to think about the context before the read the materials as a preparation. <u>Tutorials:</u> Tutorials are designed to guide the students to complete their essays with the support of evidences and data. Students working on similar topics formed groups to discuss and comment on the outline. Tutorials will allow students to more directly engage the material with ready access to the teacher. Scientific publications database will be introduced for literature survey. The students will also learn to cite other information properly. In later stage, the students will also prepare a poster with oral presentation based on their essays. <u>Individual Study:</u> Students will be expected to spend two to three hours on reading outside the classroom. Questions will be given to prepare the students on the issues discussed. Since this may be an area of weakness for Hong Kong students, clear guidelines and checks will be put in place to ensure that it occurs. Exercises with questions on the textbook materials will be used to keep track on the students' participation in reading assignment. This is also part of their continuous assessment. The emphasis in this subject on reading comprehension is designed to give the student an essential experience of empowerment in learning to study effectively.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
			1	2	3	4	5	6
	1. Quiz	45%	√	√	√	√		
	2. Tutorial participation + lecture attendance	10%		√	√	√	√	√
	3. Presentation	15%	√	√	√	√	√	√
	4. Essay	30%	√	√	√	√		√
	Total	100%						
Student Study Effort Expected	Class contact:							
	• Lectures				26 Hours			
	• Tutorials				13 Hours			
	Other student study effort:							
	• Preparation for presentation				16 Hours			
	• Self Study				41 - 60 Hours			
	Total student study effort:				96 - 115 Hours			
Reading List and References	References 1. Frammer, G. Thomas and Cook, John “Climate Change Science: A Modern Synthesis”, Springer, 2013. (eBook available) 2. Trevor M. Letcher, “Climate Change: Observed Impacts on Planet Earth”, Elsevier, 2009. (eBook available) 3. Craven, G., “What's the Worst That Could Happen?: A Rational Response to the Climate Change Debate”, Perigee Trade, 2009. 4. Zero carbon footprint (In Cantonese) / Hong Kong: RTHK, 2007 (24001 DVD; 1 videodisc (22 minutes). 5. Sustainable Living Guide, http://www.planetfriendly.net/living.html (accessed 2010) 6. Water Resources, http://www.wsd.gov.hk/en/water_resources/raw_water_sources/index.html , Water Supplies Department, HKSAR							
Last Updated	July 2016							
Prepared by	ABCT Department							

Subject Description Form

Subject Code	AMA1110																												
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics																												
Credit Value	3																												
Level	1																												
Pre-requisite / Co-requisite / Exclusion	Nil																												
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.																												
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply analytical reasoning to solve problems in science and engineering; 2. Make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; 3. Apply mathematical modeling in problem solving; 4. Demonstrate abilities of logical and analytical thinking.																												
Subject Synopsis/ Indicative Syllabus	Syllabus: <u>Elementary calculus</u> Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus. <u>Elementary Probability and Statistics</u> Descriptive statistics, random variables, probability and probability distributions, binomial, Poisson and normal distributions, applications. Population and random samples. Sampling distributions related to sample mean, sample proportions, and sample variances. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean and the difference between two means.																												
Teaching/Learning Methodology	Basic concepts and elementary techniques of differential and integral calculus, elementary statistics and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.																												
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>1. Homework, quizzes and mid-term test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr> <tr> <td>2. 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> </tbody> </table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				1	2	3	4	1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	Total	100 %				
Specific assessment methods/tasks	% weighting			Intended subject learning outcomes to be assessed (Please tick as appropriate)																									
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2. Examination	60%	✓	✓	✓	✓																								
Total	100 %																												

	Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester. Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering. To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.	
Student Study Effort Expected	Class contact:	
	• Lecture	26 Hours
	• Tutorial	13 Hours
	Other student study effort:	
	• Homework and self study	81 Hours
	Total student study effort:	120 Hours
Reading List and References	1. K.C. Chung, <i>A Short Course in Calculus and Matrices</i>, McGraw Hill 2013. 2. K.F. Hung, Wilson Kwan, T.Y. Pong, <i>Foundation Mathematics & Statistics</i>, McGraw Hill 2013. 3. R. Larson, B. Edwards, <i>Single Variable Calculus</i>, Brooks/Cole 2012. 4. R.E. Walpole, R.H. Myers, S.L. Myers, K Ye, <i>Probability and Statistics for Engineers and Scientists</i>, Prentice Hall, 2012.	
Last Updated	August 2017	
Prepared by	AMA Department	

Subject Description Form

Subject Code	AMA1120																												
Subject Title	Basic Mathematics II –Calculus and Linear algebra																												
Credit Value	3																												
Level	1																												
Pre-requisite	AMA1110 Basic Mathematics I – Calculus and Probability & Statistics																												
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.																												
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply analytical reasoning to solve problems in science and engineering; 2. Make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; 3. Apply mathematical modeling in problem solving; 4. Demonstrate abilities of logical and analytical thinking.																												
Subject Synopsis/ Indicative Syllabus	Syllabus: <u>Elementary calculus</u> Mean Value Theorem with applications to optimization and curve sketching. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and physics. Improper Integrals. <u>Linear algebra</u> Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer's rule, vectors in 2-space or in 3-space, applications to geometry.																												
Teaching/Learning Methodology	Basic concepts and elementary techniques of differential and integral calculus and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.																												
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" style="width: 100%;"> <thead> <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> </thead> <tbody> <tr> <td>1. Homework, quizzes and mid-term test</td><td>40%</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td></tr> <tr> <td>2. Examination</td><td>60%</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td><td style="text-align: center;">✓</td></tr> <tr> <td>Total</td><td>100 %</td><td colspan="4"></td></tr> </tbody> </table> Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester. Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				1	2	3	4	1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	Total	100 %				
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2. Examination	60%	✓	✓	✓	✓																								
Total	100 %																												

	to use mathematical techniques in solving problems in science and engineering. To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.	
Student Study Effort Expected	Class contact:	
	• Lecture	26 Hours
	• Tutorial	13 Hours
	Other student study effort:	
	• Homework and self-study	81 Hours
	Total student study effort	120 Hours
Reading List and References	1. K.C. Chung, <i>A Short Course in Calculus and Matrices</i>, McGraw Hill 2013. 2. K.F. Hung, Wilson Kwan, T.Y. Pong, <i>Foundation Mathematics & Statistics</i>, McGraw Hill 2013. 3. R. Larson, B. Edwards, <i>Single Variable Calculus</i>, Brooks/Cole 2012. 4. R. Larson, <i>Elementary Linear Algebra</i>, Brooks/Cole 2013.	
Last Updated	August 2017	
Prepared by	AMA Department	

Subject Description Form

Subject Code	AP10001
Subject Title	Introduction to Physics
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This is a subject designed for students with no background in physics studies. Fundamental concepts in major topics of physics (mechanics, heat, wave and electromagnetism) will be discussed. The aim of this subject is to equip students with some basic physics knowledge, and to appreciate its applications in various branches of science and technology.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Solve simple problems in kinematics Newton's law and Energy; 2. Solve problems in heat capacity and latent heat; 3. Explain phenomena related to the wave character of light; 4. Apply the superposition of waves; 5. Understand electrostatic field and potential; 6. Solve problems on interaction between current and magnetic field; and 7. Describe and demonstrate the phenomenon of electromagnetism.
Subject Synopsis/ Indicative Syllabus	Syllabus: Mechanics: scalars and vectors; kinematics and dynamics; Newton's laws; momentum, impulse, work and energy; conservation of momentum and conservation of energy. Thermal physics: heat and internal energy; heat capacity; conduction, convection and radiation; latent heat. Waves: nature of waves; wave motion; reflection and refraction; image formation by mirrors and lenses; superposition of waves; standing waves; diffraction and interference; electromagnetic spectrum; sound waves. Electromagnetism: charges; Coulomb's law; electric field and potential; current and resistance; Ohm's law; magnetic field; magnetic force on moving charges and current-carrying conductors; Faraday's law and Lenz's law.
Teaching/Learning Methodology	Lecture: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes	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%	✓	✓	✓	✓	✓	✓	✓	
	2. Examination	60%	✓	✓	✓	✓	✓	✓	✓	
	Total	100%								
	Continuous assessment:									
	The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.									
	Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.									
	At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.									
	Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.									
Student Study Effort Expected	Class contact:									
	• Lecture								33 Hours	
	• Tutorial								6 Hours	
	Other student study effort:									
	• Self-study								81 Hours	
	Total student study effort								120 Hours	
Reading List and References	1. John D. Cutnell & Kenneth W. Johnson, <i>Introduction to Physics</i> , 9 th ed., 2013, John Wiley & Sons. 2. Hewitt, <i>Conceptual Physics</i> , 11 th ed., 2010, Benjamin Cummings.									
Last Updated	July 2016									
Prepared by	AP Department									

Subject Description Form

Subject Code	AP10005
Subject Title	Physics I
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Solve simple problems in single-particle mechanics using calculus and vectors; 2. Solve problems in mechanics of many-particle systems using calculus and vectors; 3. Understand simple harmonic motion and solve simple problems; 4. Solve problems related to acoustic standing waves; 5. Calculate changes in frequency received due to Doppler's effect; 6. Apply ideal gas laws to solve problems; 7. Apply the first law of thermodynamics to simple processes; and 8. Solve simple problems related to the cyclic processes.
Subject Synopsis/ Indicative Syllabus	Syllabus: Mechanics: calculus-based kinematics, dynamics and Newton's laws; calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; conservation law; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves and beats. Thermal physics: conduction, convection and radiation; black body radiation; ideal gas and kinetic theory; work, heat and internal energy; first law of thermodynamics; entropy and the second law of thermodynamics; Carnot cycle; heat engine and refrigerators.
Teaching/Learning Methodology	Lecture: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes	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	40%	✓	✓	✓	✓	✓	✓	✓	✓	
	2. Examination	60%	✓	✓	✓	✓	✓	✓	✓	✓	
	Total	100%									
	Continuous assessment: The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students' study throughout the course, assisting them in fulfilling the learning outcomes. Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach. At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class. Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.										
Student Study Effort Expected	Class contact:										
	• Lecture								33 Hours		
	• Tutorial								6 Hours		
	Other student study effort:										
	• Self-study								81 Hours		
	Total student study effort:								120 Hours		
Reading List and References	1. John W. Jewett and Raymond A. Serway, <i>Physics for Scientists and Engineers</i> , 2014, 9 th ed., Brooks/Cole Cengage Learning. 2. Hafez A. Radi, John O. Rasmussen, <i>Principles of physics: for scientists and engineers</i> , 2013, Springer. 3. W. Bauer and G.D. Westfall, <i>University Physics with Modern Physics</i> , 2011, McGraw-Hill.										
Last Updated	July 2016										
Prepared by	AP Department										

Subject Description Form

Subject Code	AP10006
Subject Title	Physics II
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with fundamental knowledge in physics focusing on the topics of waves and electromagnetism. This course prepares students to study science, engineering or related programmes.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply simple laws in optics to explain image formation; 2. Understand phenomena related to the wave character of light; 3. Solve problems in electrostatics; 4. Solve problems on interaction between current and magnetic field; 5. Apply electromagnetic induction to various phenomena; and 6. Solve problems in simple circuits.
Subject Synopsis/ Indicative Syllabus	Syllabus: Waves and optics: nature of light, reflection and refraction; Snell's law; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen's principle; interference and diffraction; diffraction grating; Rayleigh's criterion and optical resolution; polarization. Electromagnetism: charge and Field; Coulomb's law and Gauss' law; electrostatic field and potential difference; capacitors and dielectric; current and resistance; Ohm's law; electromotive force, potential difference; Lorentz force; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; induction; transformers; AC circuits and applications.
Teaching/Learning Methodology	Lecture: The fundamentals in optics and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes	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	40%	✓	✓	✓	✓	✓	✓
	2. Examination	60%	✓	✓	✓	✓	✓	✓
	Total	100%						
	Continuous assessment:							
	The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students’ study throughout the course, assisting them in fulfilling the learning outcomes.							
	Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.							
	At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.							
	Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.							
Student Study Effort Expected	Class contact:							
	• Lecture						33 Hours	
	• Tutorial						6 Hours	
	Other student study effort:							
	• Self-study						81 Hours	
	Total student study effort						120 Hours	
Reading List and References	1. John W. Jewett and Raymond A. Serway, <i>Physics for Scientists and Engineers</i> , 2014, 9 th ed., Brooks/Cole Cengage Learning. 2. Hafez A. Radi, John O. Rasmussen, <i>Principles of physics: for scientists and engineers</i> , 2013, Springer. 3. W. Bauer and G.D. Westfall, <i>University Physics with Modern Physics</i> , 2011, McGraw-Hill.							
Last Updated	July 2016							
Prepared by	AP Department							

Subject Description Form

Subject Code	BME11101
Subject Title	Bionic Human and the Future of Being Human
Credit Value	3
Level	1
Pre-requisite/ Co-requisite	Nil
Exclusion	Biomedical Engineering students
Objectives	To introduce, in a multidisciplinary and interactive approach, the various ways through which defective body parts can be replaced or augmented by artificial devices. The focus is to illustrate how modern biomedical engineering technologies deal with diseases, trauma, and ageing. These technology-enabled medical advancements are discussed along with the associated philosophical and ethical issues.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Describe some of the amazing designs in human body and their potential damages due to injuries, diseases, and ageing; 2. Give examples on how engineering has helped in reconstructing damaged body parts and/or body functions, such as hearing, seeing, movement, etc.; 3. Reflect on our human imagination about the bionic human of the future; 4. Discuss some of the philosophical, societal and ethical issues associated with such technological developments; and 5. Fulfill the CAR reading and writing requirements in English.
Subject Synopsis/ Indicative Syllabus	Human life is both amazing and vulnerable. Amazing – the designs and working of our human bodies are the envies of engineering science. Vulnerable – the best and the strongest are still mortal. We are susceptible to trauma, diseases, ageing and finally death. Advances in life science and engineering are bringing to us in fast cadence and big strides innovative breakthroughs and new possibilities in healing and rejuvenation, functional recoveries and health enablement. Powered intelligent prostheses for subjects with amputation, fully implantable artificial hearts for subjects with heart failures, tissue engineered skin for severely burnt subjects, stem cells therapies for impaired brain tissues are examples that our body can be fixed by replacing the defective components with artificial “spare parts” and other augmentative measures. At the same time, research laboratories are developing intelligent robots that can see, hear, smell, talk, walk, dance, think, and feel like human – following a centuries-long human quest for “living” machines. The mechanistic implications of these biomedical and engineering advances seem apparent – Is human a robot? Can robot one day become human? The artists among us are quick to perceive and even exploit these implications. The entertainment media have imaginatively presented many kinds of human-robotic hybrids, both as heroes and villains, often with power and abilities beyond those of a human. What could we tell about ourselves from our quests, pursuits, and dreams? How may one define the borderline between human and robot? What does it mean to be a human? This subject derives from the instructors’ teaching and research in biomedical engineering, prosthetics, robotics, etc. and their well-round reflections in the realms of science, technology and humanity. The subject starts by illustrating the many amazing designs in our human body and yet how vulnerable we are in terms of injuries, diseases and ageing. Examples on how modern biomedical engineering helps us face our human conditions are given. The topics “intelligence and artificial intelligence” and “senses and artificial senses then

	follows, along with a historical account of human quest for “living” machine, including a brief coverage of modern movies on bionic human. The subject wraps up with some social, ethical and philosophical reflections on the above issues and on the meaning of being human, opening up questions concerning the perennial human quest of becoming super human. All students keen in the above issues are welcome to take this subject. Indicative Subject Syllabus: The Amazing Human Body The Vulnerable Human Body The State of Science in Biomedical Engineering • Musculoskeletal Prosthetics and Orthotics • Cardiovascular Implants • Other Artificial Organs • Stem Cell and Tissue Engineering • Bio-Nano-Robotics • Senses & Artificial Senses • Intelligence & Artificial Intelligence Bionic Human - Science Fiction or Reality Human versus Bionic Human versus Robot Ethical & Social Concerns The Meaning of Being Human Future Super Human - a Human Quest																																	
Teaching/Learning Methodology	Lectures/ Videos/ Group Discussion Students are required to participate in writing instructional activities: online lectures on (1) integrating sources in writing; (2) developing cohesion and coherence in extended texts; and (3) developing an appropriate style for writing, as well as 2 writing consultation sessions for feedback, suggestions, and improvement on the book report writing by ELC staff. To fulfill the ER and EW requirements, students have to read a selected book (given in the Reading List, total reading not less than 200 pages or 100,000 words) and write a book report (~2,500 words in length). Students will submit the first draft of the book report (1,000-word continuous/ extended piece of writing) in the middle of the semester. Shortly afterward, ELC staff will provide detailed written feedback and discuss with the students their first drafts in the first consultation session. Close to the end of the semester, students will submit a revised draft (with changes made based on ELC staff's comments plus 800 more words) and attend the second consultation session to discuss the extent to which the students have revised the draft and how well. Students will receive further suggestions for improvement before they submit the final draft.																																	
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="5">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></tr><tr><td>Short Quizzes on • Lectures 50% • Readings 10% </td><td>60%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Book Report • Content 30% • English Writing 10% </td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Total</td><td>100%</td><td colspan="5"></td></tr></table>	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					1	2	3	4	5	Short Quizzes on • Lectures 50% • Readings 10%	60%	√	√	√	√	√	Book Report • Content 30% • English Writing 10%	40%	√	√	√	√	√	Total	100%					
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Book Report • Content 30% • English Writing 10%	40%	√	√	√	√	√																												
Total	100%																																	

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Short quizzes will assess students' understanding of the lecture and reading materials related to all intended learning outcomes. Book report can also assess students' ability in all intended learning outcomes, especially the CAR English writing requirement.	
Student Study Effort Expected	Class contact:	
	• Lectures	35 Hours
	• Short Quizzes	3 Hours
	• Writing Requirement Instructional Activities (Lectures and Small-Group Tutorials)	1 Hour
	Other student study effort:	
	• Reading and Book Report Writing	87 Hours
	Total student study effort	126 Hours
Reading List and References	SELECTED BOOKS FOR BOOK REPORT (FOR ER AND EW REQUIREMENTS): (Students will be asked to read <u>one of the following</u> books and complete a book report of ~2,500 words) 1. Bar-Cohen Y and Hanson D, <i>The Coming Robot Revolution: Expectations and Fears About Emerging Intelligent, Humanlike Machines</i> , Springer, 2009. 2. Perkowitz S, <i>Digital People – From Bionic Humans to Androids</i> , Joseph Henry Press, 2005. REFERENCES: 1. Lin P, Abney K and Bekey GA, <i>Robot Ethics: The Ethical and Social Implications of Robotics</i> , The MIT Press, 2011. 2. Gunkel DJ, <i>The Machine Question: Critical Perspectives on AI, Robotics, and Ethics</i> , The MIT Press, 2012. 3. Johnson FE and Virgo KS, <i>Bionic Human: Health Promotion for People with Implanted Prosthetic Devices</i> , Humana Press, 2005. 4. Naam R, <i>More Than Human: Embracing the Promise of Biological Enhancement</i> , Lulu. 5. Franchi S and Guzeldere G, <i>Mechanical Bodies, Computational Minds</i> . MIT Press, 2005. 6. Clark A, <i>Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence</i> , Oxford Press, 2003. 7. Georges TM, <i>Digital Soul: Intelligent Machines and Human Values</i> , Westview Press, 2003. 8. Brook RA, <i>Flesh and Machines: How Robots will Change Us</i> , Pantheon Books, 2002. Selected articles and video clips.	
Last Updated	August 2017	
Prepared by	BME Department	

Subject Description Form

Subject Code	CBS1104C (Cantonese) / CBS1104P (Putonghua) <i>Remarks: Students taking the Cantonese version of CBS1104 (i.e. CBS1104C) will be offered a 39 hour non-credit bearing e-learning course in Putonghua (optional).</i>
Subject Title	University Chinese (大學中文)
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Students with HKDSE Chinese subject result at level 3 or above or equivalent
Objectives	This subject aims at enhancing the students' command of language knowledge to communicate effectively in both written and spoken Chinese, with particular reference to the stylistic variations of expression in different communicative settings. The ultimate goal of this subject is to train students to be effective communicators and life-long learners, and to equip them for the Chinese Discipline-Specific Language Requirement subject.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Consolidate the ability to identify and correct the most common errors in written texts; 2. Develop Chinese writing skills through the analysis and in-depth reading of selected literary masterpieces; 3. Master the format, organization, language and style of expression of various genres of Chinese writing; 4. Produce formal presentations in spoken Chinese effectively and appropriately
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. Written communication Language, format and organization of each genre; coherence and thread of thinking in Chinese writing; style of expression of different genres; context dependent stylistic variation; development of logical and persuasive arguments. 2. Spoken communication Choice of words; articulation and flow of speaking; manner of speaking and gesture; identification of main idea and key messages; evaluation of relevancy of information in a message; skills of summarizing; agreeing / disagreeing / answering to questions politely; use of visual aids; body movement. 3. Reading strategies Intensive and critical reading; identification of authors' stances, arguments and purposes; extracting useful information from the texts; determination of the meanings of the important concept words in context; evaluation of the validity of the factual information and arguments of the texts; appreciation of different genres including literary masterpieces. 4. Language development Grammatical skills; use of clear words; use of specific sentences; choice of diction.

Teaching/Learning Methodology	The teaching/learning methodology is a combination of highly interactive seminars, self-formed study groups, seminar discussion, oral presentations and written assignments. E-learning materials for enhancing students’ proficiency in both spoken and written Chinese are included in Chinese LCR teaching.					
	Students are expected to follow teachers’ guidelines and get access to the materials on the e-Learning platform for self-study on a voluntary basis.					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			1	2	3	4
	1. Quizzes / Exercises	20%	√		√	
	2. Written Assignments	55%	√	√	√	
	3. Oral presentation	25%	√		√	√
	Total	100 %				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The quizzes and exercises are designed to assess students’ basic knowledge of Chinese linguistics and how well they achieve ILOs (1) and (3). The writing assessments aim to obtain an objective measurement of students’ basic competence in the use of written Chinese in accurate and appropriate grammatical structures (ref. ILOs (1), (2) and (3)). The oral assessment assesses students’ ability to plan and present accurately, appropriately and effectively (ref. ILOs (1), (3) and (4)). Explanations and exercises are provided in classroom teaching.					
Student Study Effort Expected	Class contact:					
	• Seminar				39 Hours	
	Additional activity:					
	• e-Learning in Putonghua and written Chinese				9 Hours	
	Other student study effort:					
	• Outside Class Practice				39 Hours	
	• Self-study				39 Hours	
	Total student study effort				126 Hours	
Reading List and References	1. 于成鯤、陳瑞端、秦扶一、金振邦主編：《當代應用文寫作規範叢書》，上海：復旦大學出版社，2011年。 2. 任伯江：《口語傳意權能：人際關係策略與潛力》，香港：香港中文大學出版社，2006年。 3. 吳禮權：《演講的技巧》，香港：商務印書館，2013年。 4. 李錦昌：《商業溝通與應用文大全》，香港：商務印書館，2012年。 5. 邵敬敏：《現代漢語通論》，上海：上海教育出版社，2007年。 6. 香港城市大學語文學部編著：《中文傳意－基礎篇》。香港：香港城市大學出版社，2001。					

	7. 香港城市大學語文文學部編著：《中文傳意－寫作篇》。香港：香港城市大學出版社，2001。 8. 孫光萱：《中國現代散文名家名篇賞讀》，上海：上海教育出版社，2001年。 9. 梁慧敏：《正識中文》，香港：三聯書店，2010年。 10. 梁慧敏：《語文正解》，香港：三聯書店，2015年。 11. 梁慧敏：《語文通病》，香港：三聯書店，2014年。 12. 陳瑞端，《生活病語》，香港：中華書局，2000。 13. 陳瑞端：《生活錯別字》，香港：中華書局，2000年。 14. 賴蘭香：《傳媒中文寫作》(新修本)，香港：中華書局，2012年。
Last Updated	July 2018
Prepared by	CBS Department

Subject Description Form

Subject Code	CBS1151																																																											
Subject Title	Chinese I (for non-Chinese speaking students) 漢語 I (非華語學生課程)																																																											
Credit Value	3																																																											
Level	1																																																											
Pre-requisite / Co-requisite/ Exclusion	For non-Chinese speaking students at beginners' level																																																											
Objectives	This subject aims to introduce to non-Chinese speaking students with basic phonological structure of modern standard Chinese and enable them to master the Chinese phonology and conduct simple conversation in Chinese.																																																											
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Master basic pronunciations of Chinese; 2. Make use of the Hanyu Pinyin system as a learning tool and for self-study; 3. Acquire some basic common vocabulary and basic sentence patterns; 4. Comprehend simple messages conveyed in Putonghua; 5. Engage in simple daily communication in Putonghua;																																																											
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. The Hanyu Pinyin System; 2. The Pronunciation of Phonetic Symbols; 3. The Syllabic Structure of Putonghua; 4. Tone Variation, Neutral Tone and Final Retroflexion ; 5. 100 Characters and 200 Common Words; 6. Common Expressions and Sentence Structure; 7. Simple Daily Conversation; 8. Vocabulary and Expression for Xi'an Tour (for China mode)																																																											
Teaching/Learning Methodology	Teaching and learning activities will be in the form of interactive seminars where students will be given a lot of chances to practice. After class consultation forms another major element to maximize communications between students and teachers.																																																											
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="width: 30%;">Specific Assessment Methods/Tasks</th><th rowspan="2" style="width: 10%;">% Weighting</th><th colspan="5">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></tr> </thead> <tbody> <tr> <td>1. Listening Practice</td><td>20%</td><td>√</td><td></td><td>√</td><td>√</td><td></td></tr> <tr> <td>2. Vocabulary and Grammar Practice</td><td>30%</td><td>√</td><td></td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>3. Oral Presentation</td><td>20%</td><td>√</td><td>√</td><td>√</td><td></td><td>√</td></tr> <tr> <td>4. Conversation Practice</td><td>20%</td><td>√</td><td>√</td><td>√</td><td></td><td>√</td></tr> <tr> <td>5. In-class Participation</td><td>10%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>Total (Continuous Assessment)</td><td>100 %</td><td colspan="5"></td></tr> </tbody> </table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment methods aim to:						Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					1	2	3	4	5	1. Listening Practice	20%	√		√	√		2. Vocabulary and Grammar Practice	30%	√		√	√	√	3. Oral Presentation	20%	√	√	√		√	4. Conversation Practice	20%	√	√	√		√	5. In-class Participation	10%	√	√	√	√	√	Total (Continuous Assessment)	100 %					
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3. Oral Presentation	20%	√	√	√		√																																																						
4. Conversation Practice	20%	√	√	√		√																																																						
5. In-class Participation	10%	√	√	√	√	√																																																						
Total (Continuous Assessment)	100 %																																																											

	(1) Distinguish the initials, finals and tones of monosyllables and disyllables and words; (2) Understand the meaning of simple statement and short conversation in actual communicative situations; (3) Present a self-introduction in Chinese; (4) Master the vocabulary and sentence patterns learned; (5) Give the proper answers to the questions asked by teachers; and (6) Know the meaning of basic characters. All assignments are in continuous assessment. Each assignment will be evaluated in terms of criterion reference assessment.	
Student Study Effort Expected	Class contact:	
	• Seminar	39 Hours
	Other student study effort:	
	• Outside Class Practice	42 Hours
	• Self-study	42 Hours
	Total student study effort:	123 Hours
Student Study Effort Expected (for China mode)	Class contact:	
	• Lectures/Seminars/Tutorials	28-39 Hours
	• Study visits	15-20 Hours
	Other student study effort:	
	• Readings/Discussion/Report and Essay Writing/Outside Class Practice/Self-study	64-78 Hours
	Total student study effort:	107-137 Hours
Reading List and References	Textbook: 劉珣主編：《新實用漢語課本》第一冊 (<i>New Practical Chinese Reader</i>) (Vol.1)，北京語言大學出版社，2007 年。	
Last Updated	July 2018	
Prepared by	CBS Department	

Subject Description Form

Subject Code	CBS1152
Subject Title	Chinese II (for non-Chinese speaking students) 漢語 II (非華語學生課程)
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	- For non-Chinese speaking students; and - Students who have completed Chinese I or equivalent
Objectives	This subject aims to enhance non-Chinese-speaking students' oral communication skill and their ability in conducting simple daily conversation in Chinese.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Improve their pronunciation in Chinese; 2. Be able to carry out simple conversation; 3. Understand basic sentence patterns in Chinese; 4. Recognize 100 new Chinese characters; 5. Understand and be able to use 200 new words; and 6. Input Chinese by means of Pinyin.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. Pronunciation 2. Vocabularies and Grammar 3. Speaking Skills 4. Pragmatics Rules and Implication 5. Cultural Background of China Reflected in Daily Conversation 6. Structure of Chinese Character and Character Writing 7. Conversation on one's own background, immediate environment and matters.
Teaching/Learning Methodology	Teaching and learning activities will be in the form of interactive seminars where students will be given a lot of chances to practice. After class consultation forms another major element to maximize communications between students and teachers.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)						
			1	2	3	4	5	6	
	1. Listening Practice	10%	√		√	√			
	2. Vocabulary and Grammar Practice	25%	√		√	√	√		
	3. Oral Presentation	20%	√	√	√		√		
	4. Conversation Practice	20%	√	√	√		√		
	5. Writing Practice	15%					√	√	
	6. In-class Participation	10%	√	√	√	√	√	√	
	Total (Continuous Assessment)	100 %							
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment methods aim to: (1) Distinguish the tones of monosyllables, the neutral tone of disyllables and words; (2) Understand the meaning of conversation in actual communicative settings; (3) Conduct a dialogue in designed situations in Chinese; (4) Master the vocabulary and sentence patterns learned; (5) Assess the fluency and accuracy of students' Chinese by asking them to recite a text; and (6) Write Chinese sentences. All assignments are in continuous assessment. Each assignment will be evaluated in terms of criterion reference assessment.								
Student Study Effort Expected	Class contact:								
	• Seminar						39 Hours		
	Other student study effort:								
	• Outside Class Practice						42 Hours		
	• Self-study						29 Hours		
	Total student study effort:						110 Hours		
Reading List and References	Textbook: 劉珣主編《新實用漢語課本》第一冊 (New Practical Chinese Reader (Vol. 1), 北京語言大學出版社, 2007 年。								
Last Updated	July 2016								
Prepared by	CBS Department								

Subject Description Form

Subject Code	CBS1153
Subject Title	Elementary Cantonese (Taught in English) 基礎廣東話（以英語授課）
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	For students whose native language is not Cantonese (exclude students whose native language is Cantonese)
Objectives	This subject aims to: • introduce basic phonological structure of modern standard Cantonese to non-Chinese speaking students; and • enable them to put knowledge into practice by conducting simple conversation in Cantonese.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Master basic pronunciations of Cantonese, 2. Make use of the Yue Pin system as a learning tool and for self-study, 3. Acquire some basic vocabularies and basic sentence patterns, 4. Comprehend simple messages conveyed in Cantonese, 5. Engage in simple daily communication in Cantonese.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. The Yue Pin (Jyutping) System 2. The pronunciation of phonetic symbols 3. The syllabic structure of Cantonese 4. Tone variations and change in pronunciation 5. Common expressions and sentence structure 6. Simple daily conversation 7. Common used simple Chinese Characters in Cantonese.
Teaching/Learning Methodology	The course adopts an interactive way of learning/teaching where students will have a lot of chances to put knowledge into practice. In addition to classroom teaching and exercises, group discussion and role-play learning will be the mode of learning. Teacher consultations will also be part of the course.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Listening & Writing Quiz	20%	✓		✓	✓	
	2. Self-introduction	15%	✓		✓	✓	✓
	3. Translation and Pair Conversation	15%	✓	✓	✓		✓
	4. Written & Oral Exam	40%	✓	✓	✓		✓
	5. Classroom Participation	10%	✓	✓	✓	✓	✓
	Total (Continuous Assessment)	100 %					
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessments focus on: (1) Basic knowledge in Cantonese in terms of word and grammar, (2) The ability to use Cantonese jyutping in reading and writing, and (3) Speaking in Cantonese, individually and in group work. As interaction is emphasized, class participation is also assessed.							
Student Study Effort Expected	Class contact:						
	• Seminar					39 Hours	
	Other student study effort:						
	• Outside Class Practice					39 Hours	
	• Self-study					39 Hours	
	Total student study effort:					117 Hours	
Reading List and References	Required: 1. Chow, Bun-Ching: <i>Cantonese for Everyone (Jyutping version</i> , Hong Kong: The Commercial Press, 2007. References: 1. Stephen Matthews and Virginia Yip: <i>Cantonese: A Comprehensive Grammar</i> , Routledge, 2011. 2. Chan Kwok Kin, Betty Hung: <i>A Cantonese Book (3rd Edition)</i> , Hong Kong: Greenwood Press, 2009. 3. The New Asia – Yale-in-China Chinese Language Center: <i>English-Cantonese Dictionary</i> , Hong Kong: The Chinese University Press, 2000. 4. Chinese Character Database (Phonologically Disambiguated According to the Cantonese Dialect) 中文大學，《粵語審音配詞字典》 http://humanum.arts.cuhk.edu.hk/Lexis/lexi-can/						
Last Updated	July 2016						
Prepared by	CBS Department						

Subject Description Form

Subject Code	CBS1153P																																													
Subject Title	Elementary Cantonese (Taught in Putonghua) 基礎廣東話 (以普通話授課)																																													
Credit Value	3																																													
Level	1																																													
Pre-requisite/Co-requisite/ Exclusion	For students whose native language is not Cantonese (exclude students whose native language is Cantonese)																																													
Objectives	This subject aims to help non-Cantonese speaking students to use Cantonese to communicate with people for daily life contacts in Hong Kong.																																													
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Acquire the pronunciation, vocabulary, sentence structure, and some written characters of Cantonese, 2. Deal with daily life business in Hong Kong, 3. To communicate with local students and people, 4. Achieve a wider and deeper understanding of the life of Hong Kong people and their cultural heritage.																																													
Subject Synopsis/ Indicative Syllabus	The contents of the syllabus include two major parts: communicative situations and linguistic knowledge of Cantonese. These two domains go in parallel with each other. There are 10 communicative situations covering themes of interaction such as “Introducing each other”, “Having a phone call”, “Making an appointment”, “Asking where to go in the street”, “Shopping” and the like. After introducing the phonological systems of Cantonese, in each of the 10 communicative situations, there is a focal point of grammar or in expression. For example, in “Introducing each other”, the way of saying one’s name, and the position of using the adverb “先” in a sentence, will be the focal point of learning and teaching in linguistic terms.																																													
Teaching/Learning Methodology	The course adopts an interactive way of learning/teaching where students will have a lot of chances to put knowledge into practice. In addition to classroom learning and exercises, group discussion, and role-play learning, there will be, outside classroom activities such as actual shopping in a market, buying tickets, film watching etc. Teacher consultations will also be part of the course.																																													
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>1. Class Participation</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>2. Test of Words & Grammar</td><td>30%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>3. Individual Presentation</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>4. Group Presentation / Report</td><td>30%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>Total (Continuous Assessment)</td><td>100 %</td><td colspan="4"></td></tr> </tbody> </table>						Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Class Participation	20%	√	√	√	√	2. Test of Words & Grammar	30%	√	√	√	√	3. Individual Presentation	20%	√	√	√	√	4. Group Presentation / Report	30%	√	√	√	√	Total (Continuous Assessment)	100 %				
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	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessments are in two aspects: (1) Linguistic knowledge which will be assessed by test on word and grammar. (2) Oral presentation means to assess the ability of communication in two manners, individual and group work. As interaction is emphasized, class participation is also assessed.	
Student Study Effort Expected	Class contact:	
	• Seminar	39 Hours
	Other student study effort:	
	• Outside Class Activities	35 Hours
	• Self-study	33 Hours
	Total student study effort:	107 Hours
Reading List and References	Required: 1. 鄭定歐等編：《粵語香港話教程》，香港：三聯書店出版，2003 年 10 月。 References 1. 張洪年：《香港粵語語法的研究》（增訂版），香港中文大學，2007 年。 2. 饒秉才等：《廣州話方言詞典》，商務印書館，1996 年 11 月。 3. 歐陽覺亞：《普通話廣州話的比較與學習》，中國社會科學出版社，1996 年 9 月。 4. 《廣州音字典》（普通話對照），三聯書店（香港）有限公司，1996 年 4 月。 5. 李新魁等：《廣州方言研究》，廣東人民出版社，1995 年 6 月。 6. 曾子凡：《廣州話、普通話口語詞對譯手冊》，三聯書局，1994 年 5 月。 7. 高華年：《廣州方言研究》，商務印書館，1984 年 1 月。	
Last Updated	July 2016	
Prepared by	CBS Department	

Subject Description Form

Subject Code	ELC1011
Subject Title	Practical English for University Studies
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to develop and enhance students' general proficiency and communication skills in English. A strong focus will be given to enhancing competence and confidence in writing, grammar, vocabulary, pronunciation and fluency.
Intended Subject Learning Outcomes	Upon successful completion of the subject, students will be able to: 1. Organise and write accurate and coherent short texts 2. Improve language accuracy and the ability to proofread for common errors in written texts 3. Use appropriate verbal and non-verbal skills to enhance fluency and accuracy in spoken communication such as short presentations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present their views logically and coherently.
Subject Synopsis/ Indicative Syllabus	1. Written communication Enhancing the use of accurate and appropriate grammatical structures and vocabulary for various communicative purposes; improving the ability to organise written texts logically; and improving cohesion and coherence in writing. 2. Spoken communication Developing verbal and non-verbal interaction strategies appropriate to the context and level of formality. 3. Reading and listening Understanding the content and structure of information delivered in written and spoken texts; developing effective reading and listening strategies. 4. Language development Improving and extending relevant features of grammar, vocabulary, pronunciation and fluency.
Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting of texts, information search, mini-presentations and discussions. Students will make use of elearning resources and web-based work to improve their grammar and vocabulary, and other language skills. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			1	2	3
	1. In-class paragraph writing	20%	✓	✓	
	2. Essay writing	40%	✓	✓	
	3. Documentary presentation	40%	✓	✓	✓
	Total	100 %			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The paragraph writing test, which assess students' grammar, vocabulary and paragraph organization skills, necessitate achievement of LOs (1) and (2). The essay writing assessment evaluates students' ability write a longer text in accurate and appropriate grammatical structures (ref. LOs (1) and (2)). The documentary presentation assesses students' ability to speak accurately, appropriately and confidently. Students will research a topic, organise information from a variety of sources, and deliver the information as a digital documentary and mini-presentation (ref. LOs (1), (2) and (3)). In addition to these assessments, students are required to complete further language training through web-based language work. The additional language training offered in online tasks is aligned with all the three LOs and corresponds to their learning in class.				
Student Study Effort Expected	Class contact:				
	• Seminar		39 Hours		
	Other student study effort:				
	• Self-study/preparation		78 Hours		
	Total student study effort		117 Hours		
Reading List and References	Course material: Learning materials developed by the English Language Centre Recommended references: - Boyle, J. & Boyle, L. (1998). <i>Common Spoken English Errors in Hong Kong</i>. Hong Kong: Longman. - Brannan, B. (2003). <i>A writer's workshop: Crafting paragraphs, building essays (3rd ed.)</i>. Boston: McGraw-Hill. - Hancock, M. (2003). <i>English pronunciation in use</i>. Cambridge: Cambridge University Press. - Nettle, M. and Hopkins, D. (2003). <i>Developing grammar in context: Intermediate</i>. Cambridge: Cambridge University Press. - Redman, S. (2003). <i>English vocabulary in use: Pre-intermediate and intermediate</i>. Cambridge: Cambridge University Press. - Powell, M. (2011). <i>Presenting in English. How to get successful presentations</i>. USA. Heinle & Heinle Publishers.				
Last Updated	July 2018				
Prepared by	English Language Centre				

Subject Description Form

Subject Code	ELC1013
Subject Title	English for University Studies (This subject will be offered in two versions for students who will primarily be using (1) APA/Harvard referencing styles or (2) IEEE/Vancouver referencing styles in their university studies.)
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Students entering the University with Level 3 – 5** from the HKDSE will be required to take this course.
Objectives	This subject aims to help students study effectively in the University's English medium learning environment, and to improve and develop their English language proficiency within a framework of university study contexts.
Intended Subject Learning Outcomes	Upon successful completion of the subject, students will be able to: 1. Refer to sources in written texts and oral presentations 2. Paraphrase and summarise materials from written and spoken sources 3. Plan, write and revise expository essays with references to sources 4. Deliver effective oral presentations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present information logically and coherently.
Subject Synopsis/ Indicative Syllabus	1. Written communication • Analysing and practicing common writing functions; improving the ability of writing topic sentences and strategies for paragraph development; understanding common patterns of organization in expository writing; taking notes from written and spoken sources; practicing summarizing and paraphrasing skills; improving coherence and cohesion in writing; developing revision and proofreading skills. 2. Spoken communication • Recognising the purposes of and differences between spoken and written communication in English in university study contexts; identifying and practicing the verbal and non-verbal interaction strategies in oral presentations; developing and applying critical thinking skills to discussions of issues. 3. Language development • Improving and extending relevant features of grammar, vocabulary and pronunciation.
Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of eLearning resources to engage in academic discussions and to reflect on their learning. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			1	2	3	4
	1. Academic essay 1	30%	✓	✓	✓	
	2. Academic essay 2	30%	✓	✓	✓	
	3. Oral presentation	40%	✓	✓		✓
	Total	100 %				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assessments 1 and 2 necessitate achievement of LOs (1), (2) and (3) in order to write an effective academic essay via the process of extending and improving the essay for assessment 1. In order for students to present an effective academic oral presentation, as demanded in assessment 3, they will need to read, note and synthesize from a variety of sources, and refer to those sources in their presentation (ref. LOs (1), (2) and (4)). In addition to these assessments, students are required to complete further language training, through web-based language work, reading tasks and online reflections. The additional language training offered in online tasks is aligned with all the four LOs. In some of the tasks, students to critically read and summarize information contained in a variety of sources, as required in LOs (1) and (2).					
Student Study Effort Expected	Class contact:					
	• Seminars		39 Hours			
	Other student study effort:					
	• Self-study / Preparation		78 Hours			
	Total student study effort		117 Hours			
Reading List and References	Course material: Learning materials developed by the English Language Centre					
	Recommended references: 1. Bailey, S. (2014). <i>Academic writing: a handbook for international students</i> . Abingdon: Routledge. 2. Comfort, J. (2001). <i>Effective presentations</i> . Oxford: Cornelsen & Oxford University Press. 3. Hung, T. T. N. (2005). <i>Understanding English grammar: A course book for Chinese learners of English</i> . Hong Kong: Hong Kong University Press. 4. Tang, R. (2012). <i>Academic writing in a second or foreign language: Issues and challenges facing ESL/EFL academic writers in higher education contexts</i> . London: Continuum International Pub. 5. Zwier, L. J. (2002). <i>Building academic vocabulary</i> . Ann Arbor, MI: University of Michigan Press.					
Last Updated	July 2018					
Prepared by	English Language Centre					

Subject Description Form

Subject Code	ENG1003
Subject Title	Freshman Seminar for Engineering
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. Introduce students to the engineering broad discipline and enthuse them about their major study 2. Cultivate students' creativity and problem-solving ability, and global outlook 3. Introduce students to the concept of entrepreneurship 4. Engage the students in desirable forms of learning at university that emphasizes self-regulation, autonomous learning and deep understanding
Intended Subject Learning Outcomes	Upon completion of the subject, students will: 1. Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study 2. Develop their problem-solving ability and global outlook 3. Be able to demonstrate an understanding of entrepreneurship 4. Be able to research for information, formulate a project plan, and manage a project with initiative 5. Be able to demonstrate an understanding of academic integrity.
Subject Synopsis/ Indicative Syllabus	1. Online Tutorial on Academic Integrity (4 hours*) Students will be required to complete successfully an Online Tutorial on Academic Integrity on or before week 5 of the first semester. The students will understand the importance of academic integrity by completing the Online Tutorial. 2. Seminars (12 hours*) There will be seminars given by various speakers on various topics to introduce to students the engineering broad discipline, to enthuse them about their major study, to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession, and to cultivate students' global outlook. The formats of the seminars may be, but not limited to, Departmental Seminars, and Renowned Speaker Seminar. 3. Freshman Project (45 hours*) There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, research for information, and project management abilities through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems. (* Note: hours indicate total student workload)

	4. Entrepreneurship Project (45 hours*) The entrepreneurship project is designed to develop students' appreciation and understanding about entrepreneurship and the commercialization process by attending lectures, workshops and tutorials. In the course of the Entrepreneurship Project, students will identify technology opportunities and learn the skills of preparing a simple business plan.
Teaching/Learning Methodology	Online Tutorial on Academic Integrity The Online Tutorial on Academic Integrity is developed by the University to help the students understand the importance of academic integrity. By going through the Online Tutorial, students will be aware of the importance of upholding academic integrity during University study. They will also learn good practices by which to stay clear of dishonest behaviors and academic plagiarism. Seminars The seminars (such as renowned speaker seminars and departmental seminars) are designed to arouse students' interest about engineering. The delivery mode will be interactive and engaging. Students will be motivated to search for information and do background reading. They will be encouraged to raise questions and discuss with the presenters. Assessment tasks (quizzes) will be designed to measure students' learning outcomes as well as to encourage participation and interaction. Freshman Project For the Freshman Project, students will work collaboratively with their group members to design and implement an engineering solution to a given problem under the guidance of instructors. There will be close staff-students and students-students interaction. Students will be given opportunities to develop creativity, problem-solving skills, research for information and project management abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student's performance and achievement of the relevant intended learning outcomes as well as to encourage active participation. Entrepreneurship Project There will be lectures, workshops, and tutorials. A general overview of the concepts required to conduct the project will be provided to students through lectures. They will then work in small groups in a workshop to appreciate the essential elements in the development of a business plan and subsequently to produce a simple business plan and to present it to fellow classmates. Assessment will focus towards students' understanding about entrepreneurship, innovation and creativity.

Assessment Methods in Alignment with Intended Learning Outcomes	Students' performance in this subject will be assessed by using a letter-grading system in accordance with the University's convention from grade F (failure) to A+. The relative weights of the different assessment components are as follows:						
	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	Online Tutorial on Academic Integrity	0%					✓
	Seminars Quizzes	10%	✓	✓			
	Freshman Project Project demonstration, presentation, report and reflective essay writing	45%		✓		✓	
	Entrepreneurship Project Business plan	45%			✓	✓	
Total	100 %						
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: <u>Quizzes</u> (online or paper-based) can measure the students' <i>understanding</i> about the engineering discipline. Through <u>reflective essays</u> , students can reflect on their appreciation and understanding about the <i>engineering</i> discipline. Through project <u>demonstration</u> , <u>presentation</u> and project <u>reports</u> , students can demonstrate their <i>creativity and problem-solving skills abilities</i> . They can also demonstrate their <i>ability to research for information, formulate a project plan, and manage a project with initiative</i> . Through <u>business plan</u> , students can demonstrate their understanding about <i>entrepreneurship</i> . Pass Conditions In order to pass this subject, students must obtain a Grade D or above for total marks comprising the Seminars, Freshman Project and Entrepreneurship Project as described here <u>AND</u> pass the Online Tutorial on Academic Integrity on or before week 5 of semester 1 as described in the previous section.						
Student Study Effort Expected	Class contact:						
	• Introduction and Seminars (such as Departmental Seminars, Renowned Speaker Seminar)					6 Hours	
	• Freshman project: 3 hours per week for 5 weeks					15 Hours	
	• Entrepreneurship project: 3 hours per week for 5 weeks					15 Hours	
	Other student study effort:						
	• 4 hours for Online Tutorial on Academic Integrity; 6 hours for seminars quizzes preparation; 60 hours for Freshman project and Entrepreneurship project: background information search, project work preparation, meeting and discussion, presentation and demonstration, and report writing.					70 Hours	
	Total student study effort					106 Hours	

Reading and References List	1. H. Scott Fogler and Steven E. LeBlanc, <i>Strategies for creative problem solving</i>, Upper Saddle River, N.J. : Prentice Hall, 2008. 2. N.J. Smith (ed), <i>Engineering project management</i>, Oxford, UK; Malden, MA: Blackwell, 2008. 3. Gene Moriarty, <i>The engineering project: its nature, ethics, and promise</i>, University Park, Pa.: Pennsylvania State University Press, 2008. 4. K. Allen, <i>Entrepreneurship for scientists and engineers</i>, Upper Saddle River, N.J. : Prentice Hall, 2010. 5. The Hong Kong Institution of Engineers, "Engineering Our City", Youtube clip ref. no. nYMml6vIVeQ 6. HKIE Corporate Video, Youtube clip ref. no. INMVI8MuNEY
Last Updated	June 2017
Prepared by	Faculty of Engineering

Subject Description Form

Subject Code	AMA2104
Subject Title	Probability and Engineering Statistics
Credit Value	3
Level	2
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	The lectures aim to provide students with an integrated knowledge required for the understanding and application of statistical techniques. To develop students' ability for logical thinking and effective communication, tutorial and presentation sessions will be held.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply mathematical reasoning to analyze essential features of different statistical problems in engineering; 2. Apply appropriate probabilistic techniques to model and solve problems in engineering; 3. Make use of stochastic and Markov processes to solve typical engineering problems; 4. Search for useful information and use statistical software in solving statistical problems in the context of engineering.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Probability Theory</u> Probability and random variables; Probability distributions; Sampling distributions; Sampling means; The Central Limit Theorem; Significance and test of hypothesis. 2. <u>Stochastic Process</u> Bernoulli process; Poisson process; time averaging and ergodicity; Spectral analysis; Correlation and spectra; Wiener-Khintchine theorem; White noise; Narrow-band noise; thermal noise; Signal-to-noise ratio and probability of error; Effective noise temperature and noise figure. 3. <u>Markov Process</u> Recursions and Markov chains; Applications to queuing theory; Birth-death process.
Teaching/Learning Methodology	A two hour mass lecture will be conducted each week to initiate students into the ideas, concepts and techniques of the topics in the syllabus, which is then reinforced by a one hour tutorial designed to consolidate and develop students' knowledge through discussion and practical problem solving.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/ Tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			1	2	3	4
	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 and statistical 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:					
	• Lecture					26 Hours
	• Tutorial					13 Hours
	• Mid-term Test and Examination					5 Hours
	Other student study effort:					
	• Assignments and self-study					73 Hours
	Total student study effort:					117 Hours
Reading List and References	Textbooks: 1. D. McDonald, <i>Elements of Applied Probability: for Engineering, Mathematics and Systems Science</i>, World Scientific, 2004. 2. A.H. Haddad, <i>Probabilistic Systems and Random Signals</i>, Prentice-Hall, 2006. Reference Books: 1. R.E. Walpole, R.H. Myers, S.L. Myers and K.Y. Ye, <i>Probability and Statistics for Engineers and Scientists</i>, 9th ed., Prentice-Hall, 2012. 2. A.V. Balakrishnan, <i>Introduction to Random Processes in Engineering</i>, Wiley-Interscience, 2005.					
Last Updated	August 2017					
Prepared by	AMA Department					

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	AMA1101 Calculus I or AMA1102 Calculus IA or AMA1120 Basic Mathematics II – Calculus and Linear Algebra or AMA1500 Foundation Mathematics for Accounting and Finance
Co-requisite/ Exclusion	Exclusion: AMA2007 Intermediate Calculus and Linear Algebra, AMA2308 Mathematics for Engineers, AMA2380 Engineering Mathematics, AMA2511 Applied Mathematics I, AMA2882 Mathematics for Scientists and Engineers, AMA290 Engineering Mathematics
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. Extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. Develop and extrapolate the mathematical concepts in synthesizing and solving new problems; 4. Demonstrate abilities of logical and analytical thinking; 5. Search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Algebra of complex numbers</u> Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number. 2. <u>Linear algebra</u> Systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications. 3. <u>Ordinary differential equations</u> ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits. 4. <u>Differential calculus of functions of several variables</u> Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	✓
	2. Examination	60%	✓	✓	✓	✓	✓
	Total	100%					
	Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.						
	Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.						
	To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.						
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:						
	The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.						
Student Study Effort Expected	Class contact:						
	• Lecture		26 Hours				
	• Tutorial		13 Hours				
	• Mid-term test and examination						
	Other student study effort						
	• Assignments and Self study		78 Hours				
	Total student study effort:		117 Hours				
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, <i>Basic Engineering Mathematics</i> , McGraw-Hill, 2015. 2. H. Anton, <i>Elementary Linear Algebra</i> , 11 th ed., Wiley, 2014. 3. E. Kreyszig, <i>Advanced Engineering Mathematics</i> , 10 th ed., Wiley, 2011. 4. G. James, <i>Modern Engineering Mathematics</i> , 5 th ed., Pearson Education Limited, 2015. 5. G. B. Thomas, M. D. Weir & J. R. Hass, <i>Thomas' Calculus</i> , 14 th ed., Pearson Education 2017.						
Last Updated	August 2017						
Prepared by	AMA Department						

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite	AMA2111 Mathematics I
Co-requisite/ Exclusion	Nil
Objectives	This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. Extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. Develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. Demonstrate abilities of logical and analytical thinking; 5. Search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Multiple integrals</u> Double and triple integrals, change of variables, applications to problems in geometry and mechanics. 2. <u>Vector calculus</u> Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics. 3. <u>Series expansion</u> Infinite series, Taylor's expansion, Fourier series expansion of a periodic function. 4. <u>Partial differential equations</u> Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	✓
	2. Examination	60%	✓	✓	✓	✓	✓
	Total	100%					
	Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester. Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering. To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.						
Student Study Effort Expected	Class contact:						
	• Lecture		26 Hours				
	• Tutorial		13 Hours				
	• Mid-term test and examination						
	Other student study effort						
	• Assignments and Self study		78 Hours				
	Total student study effort:		117 Hours				
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, <i>Basic Engineering Mathematics</i>, McGraw-Hill, 2015. 2. H. Anton, <i>Elementary Linear Algebra</i>,11th ed., Wiley, 2014. 3. E. Kreyszig, <i>Advanced Engineering Mathematics</i>, 10th ed., Wiley., 2011. 4. G. James, <i>Modern Engineering Mathematics</i>, 5th ed. Pearson Education Limited, 2015. 5. G. B. Thomas, M. D. Weir, & J. R. Hass <i>Thomas' Calculus</i>, 14th ed., Pearson Education 2017.						
Last Updated	August 2017						
Prepared by	AMA Department						

Subject Description Form

Subject Code	CBS2101P
Subject Title	Putonghua in the Workplace (職業普通話)
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Remarks: - Students have completed "Fundamentals of Chinese Communication" or could demonstrate the proof with basic Putonghua proficiency - For students who are non native Putonghua speakers
Objectives	This subject aims to enhance students' communication skills in Putonghua by improving their pronunciation, ways of expression and pragmatic skills to enable them to communicate more effectively in the workplace.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Improve their pronunciation and master the conventional ways of expression in Putonghua; 2. Communicate efficiently in Putonghua with accuracy of pronunciation and fluency in the flow of speaking; 3. Perform communicative tasks in the business context; 4. Adopt appropriate pragmatic devices underlying business communication in China; 5. Understand the social and cultural background of China as reflected in business communications in China.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. Comprehensive Revision on Putonghua Communication Skills 1.1. Common Pronunciation Errors 1.2. Vocabularies and Common Expressions 1.3. Special Grammatical Features 2. In-depth Practice on Putonghua Listening Comprehension Skills 2.1. Speed and Accent 2.2. Causal Speech vs. Speech on Specialized Topics 2.3. Quantity and Structure of Information 2.4. Pragmatic Rules and Implications 3. Business Communication 3.1. Common Pragmatic Devices in Business Communications 3.2. Stylistic and Rhetorical Variations in Spoken Communications in accordance to Contextual Changes 3.3. Communicative Tasks in the Business Setting: Inquiry, Introduction, Presentation, Promotion, Question & Answer, Negotiation etc. 3.4. Commonly Used Jargons for Business and Administration 4. Social and Cultural Background of China 4.1. Different tactics adopted in different circumstances for business negotiation 4.2. Social and cultural differences between mainland and Hong Kong
Teaching/Learning Methodology	Interactive seminars with listening exercises, presentation drills, recitation, group discussion, situational pair conversation and role play; after-class self-learning hours will be required with resources provided; consultation hours will be available depending on individual students' needs. For the acquisition of social and cultural conventions in mainland China, role play will be conducted in illustrative social settings.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Presentation	25%	√	√	√	√	√
	2. Recitation	20%	√	√			
	3. Listening	15%	√	√	√	√	√
	4. Dialogue	20%	√	√	√	√	√
	5. Spoken words	10%	√				√
	6. Attendance and participation	10%	√	√	√	√	√
	Total (Continuous Assessment)	100 %					
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The modes of speech production for assessment are communication patterns commonly used across various professional contexts. The assessments will be designed with reference to the authentic social settings in the professions. All assessments will be criteria-referenced based which covers aspects in linguistic competence and communicative competence.						
Student Study Effort Expected	Class contact:						
	• Seminar		39 Hours				
	Other student study effort:						
	• Outside Class Practice		42 Hours				
	• Self-study		45 Hours				
	Total student study effort:		126 Hours				
Reading List and References	Required						
	1. 香港理工大學中國語文教學中心編：《商貿普通話教程》（上、下冊），中華書局，2005年。 Reference 1. 《現代漢語詞典（第6版）》，北京：商務印書館，2012年。 2. 張泰平編著：《國際商務漢語教程》，北京：北京大學出版社，2003年。 3. 蔡富春主編：《中國商務應用文書手冊》，香港：經濟日報出版社，2002年。 4. 李聰華著，李山根、顏慧真等譯：《中國：消費者革命》，香港：三聯書店，1999年。 5. 陳建民編著：《普通話常用口語詞和句》，香港：香港普通話研習社，1998年。 6. 楊長進等編：《商貿普通9000句》，香港：壹出版有限公司，1994年。						
Last Updated	July 2016						
Prepared by	CBS Department						

Subject Description Form

Subject Code	CBS2102P																																	
Subject Title	Creative Writing in Chinese (中文創意寫作)																																	
Credit Value	3																																	
Level	2																																	
Pre-requisite / Co-requisite/ Exclusion	- For students entering with HKDSE level 4 or above; or - Students entering with advanced competence level as determined by the entry assessment; or - Students who have completed “Fundamentals of Chinese Communication”																																	
Objectives	This subject aims to enhance students' competence in Chinese creative writing, through the study of selected novels and critical approaches and participation in workshops on writing techniques for different genres.																																	
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: - Demonstrate an understanding of the features and the principles for literary creation through the study of novels with different themes; - Compose creative works with literary and artistic techniques and rhetorical style; - Produce creative pieces under the guidance after given ample opportunities to participate in the discussion of writing techniques.																																	
Subject Synopsis/ Indicative Syllabus	- Principles of literary creation - Approaches to literary writing - themes in literature - artistic techniques and rhetorical style - demonstration and practice on literary writing - Literary criticism of selected works																																	
Teaching/Learning Methodology	The subject will be conducted in highly interactive seminars and will motivate the students' active participation by assigning group presentation /discussion in class. In a forum-like format, students are guided to: (1) Present to the class, their understanding of the novel themes selected for the syllabus for discussions; (2) Engage in formal discussion on topics related to the literary creation, and (3) Engage in actual literary writing																																	
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>1. Oral criticism of literary works (in group)</td><td>30%</td><td>√</td><td></td><td></td></tr> <tr> <td>2. Criticism article writing (individual)</td><td>30%</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>3. Creative work writing (in group)</td><td>30%</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>4. Class participation</td><td>10%</td><td>√</td><td>√</td><td>√</td></tr> <tr> <td>Total (Continuous Assessments)</td><td>100 %</td><td colspan="3"></td></tr> </tbody> </table>	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			1	2	3	1. Oral criticism of literary works (in group)	30%	√			2. Criticism article writing (individual)	30%	√	√	√	3. Creative work writing (in group)	30%	√	√	√	4. Class participation	10%	√	√	√	Total (Continuous Assessments)	100 %			
Specific Assessment Methods/Tasks	% Weighting			Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)																														
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1. Oral criticism of literary works (in group)	30%	√																																
2. Criticism article writing (individual)	30%	√	√	√																														
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4. Class participation	10%	√	√	√																														
Total (Continuous Assessments)	100 %																																	

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessments will focus on students' level of appreciation of literary works and originality in producing creative writing such as drama script (in group work). The criteria for assessment are choice of words, sentential expressions, direction of moves in writing, style and creativity.	
Student Study Effort Expected	Class contact:	
	• Seminar	39 Hours
	Other student study effort:	
	• Outside Class Practice	42 Hours
	• Self-study	45 Hours
	Total student study effort:	126 Hours
Reading List and References	科幻小說： 1. 田中芳樹（2014）。《銀河英雄傳說》。海南：南海出版公司。 2. 埃里克·尼倫德（2005）。《光量：致遠星的淪陷》。成都：四川科学技术出版社。 3. 阿瑟·克拉克（2006）。《童年的終結》。成都：四川科学技术出版社。 4. 凱特·威廉（2007）。《遲暮鳥語》。成都：四川科学技术出版社。 推理小說： 5. 松本清張（2006）。《砂之器》。台灣：獨步文化。 6. 史迪格·拉森（2008）。《龍紋身的女孩》。台灣：寂寞出版。 7. 尤·奈斯博（2011）。《知更鳥的賭注》。台灣：漫遊者文化。 8. 高野和明（2013）。《種族滅絕》。台灣：獨步文化。 戰爭小說： 9. 普羅斯佩·梅里美（2010）。〈奪堡記〉。《梅里美精選集》。北京：北京燕山出版社。 10. 埃米爾·左拉（2014）。《磨坊之役：左拉中篇小說選》。上海：上海三聯書店。 11. 阿爾封斯·都德（2010）。〈柏林之圍〉。《都德小說選》。北京：人民文学出版社。 12. 尼伊·德·莫泊桑（2010）。〈菲菲小姐〉。《讀名著學語文：莫泊桑短篇小說精選》。北京：中國對外翻譯出版公司。 歷史小說： 13. 唐浩明（2002）。《唐浩明文集——曾國藩（上中下冊）》。北京：人民文学出版社。 14. 姚雪垠（2005）。《李自成》。北京：人民文学出版社。 政治小說： 15. 喬森·奧威爾（2010）。《1984》。北京：北京十月文艺出版社。 16. 李昂（2010）。《北港香爐人人插》。台灣：九歌出版社。 17. 丸谷才一（2015）。《假聲低唱君之代》。台灣：聯經出版公司。 18. 梁啟超（2008）。《新中國未來記》。廣西：廣西師範大學出版社。 宗教小說： 19. 丹·布朗（2004）。《達芬奇密碼》。上海：上海人民出版社。 20. 楊·馬特爾（2005）。《少年 Pi 的奇幻漂流》。江蘇：譯林出版社。	

	其他： 21. 王安憶（2005）。《小說家的十三堂課》。上海：上海文藝出版社。 22. 余我（1999）。《現代文學寫作技巧》。台北：五南圖書出版公司。 23. 張德明（1995）。《文學語言描寫技巧》。北京：中國青年出版社。 24. 陳家生（1992）。《文學寫作技法入門》。福州：海峽文藝出版社。
Last Updated	July 2016
Prepared by	CBS Department

Subject Description Form

Subject Code	CBS2103P
Subject Title	Chinese and the Multimedia (中文與多媒體)
Credit Value	3
Level	2
Pre-requisite/Co-requisite/ Exclusion	Remarks: - For students entering with HKDSE level 4 or above; or - Students entering with advanced competence level as determined by the entry assessment; or - Students who have completed “Fundamentals of Chinese Communication”
Objectives	This subject introduces students to the principles and practices of multimedia design and implementation, with emphasis on the function and practice of Chinese communication in multimedia contexts. It prepares students for a convergent, multidisciplinary world by featuring writing for print, broadcast, and online media in a variety of strategic disciplines. Through a variety of designated tasks, students will learn to produce effective writing for public relations, advertising, sales and marketing in the digital age.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> - Analyze linguistic and extra-linguistic features of Chinese used in multimedia contexts; - Display familiarity with the unique Chinese writing conventions for multimedia; - Identify the features (such as purpose, audience, media, format and design) of different strategic writing in multimedia contexts; - Analyze writing situations and invoke the roles and strategies necessary to produce effective writing; and - Use, adapt and evaluate various writing skills put to the use of specific rhetorical purposes in multimedia contexts. <u>Category B: Attributes for all-roundedness</u> - Be adaptable to the demands of techniques, technologies, culture and problems of multimedia writing in the digital age; - Apply strategies for collaborating successfully and equitably with peers on developing documents; and - Develop conceptual skills and critical thinking in relation to multimedia communication.
Subject Synopsis/ Indicative Syllabus	Syllabus: - Concept of human communication. - Typical and extra-linguistic features of Chinese media texts. - Characteristics of media including texts, sounds, images, graphics, videos and animations. - The similarities and differences between print-style writing and broadcast style writing. - Strategic writing in public relations: - Newsletter - Web Writing - Radio News Releases - Video News Releases - Strategic writing in advertising:

	Print Advertisements Radio Advertisements Television Advertisements Writing stories for magazines: Interview Report News Story Feature Stories																																																
Teaching/Learning Methodology	This subject will mainly be in the form of lectures interspersed with small group discussions. By using real-life examples, a tight link between theoretical input and practical applications will be made. Students are required to work individually and in small groups to develop their own language and analytical skills.																																																
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="8">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></tr><tr><td>1. 2 short essays</td><td>60%</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr><tr><td>2. 1 group project</td><td>40%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total (Continuous Assessment)</td><td>100 %</td><td colspan="8"></td></tr></table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: 100% of the assessment for this subject is based on coursework in terms of both subject knowledge and Chinese communication skills in multimedia contexts. 60% will be based on 2 written assignments (at 30% each) which evaluate students' writing strategies and skills necessary to produce effective multimedia communication. 40% will be based on a group project on the analysis of Chinese media text collected from multimedia communication. The group project will also include an end-of-semester oral presentation.	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. 2 short essays	60%	✓			✓	✓	✓		✓	2. 1 group project	40%		✓	✓	✓		✓	✓	✓	Total (Continuous Assessment)	100 %								
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	9. 宋春陽、孟德東、張志攀：《實用新聞寫作概論》，上海：復旦大學出版社，2004 年。 10. 羅鳳珠主編：《語言、文學與資訊》，新竹：國立清華大學 出版社，2004 年。 11. 高志宏、徐智明：《廣告文案寫作》，北京：中國物價出版社，2002 年。 12. 黎運漢：《商業語言》，台北：商務印書館，2001 年。 13. 張道俊：《廣告語言技法》，北京：社會科學文獻出版社，1996 年。 14. 邵敬敏：《廣告語創作透視》，北京：北京語言學院出版社，1996 年。 15. David Crystal: <i>Language and the Internet</i>, New York: Cambridge University Press, 2006. 16. Timothy Garrand: <i>Writing for Multimedia and The Web</i>, Burlington: Elsevier Focal Press, 2006. 17. Charles Marsh, David W. Guth, Bonnie Poovey Short: <i>Strategic writing: multimedia writing for public relations, advertising, sales and marketing, and business communication</i>, Boston : Pearson Allyn and Bacon, 2005.
Last Updated	July 2016
Prepared by	CBS Department

Subject Description Form

Subject Code	CBS2151
Subject Title	Chinese III (for non-Chinese speaking students) 漢語 III (非華語學生課程)
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	- For non-Chinese speaking students at higher competence levels; and - Students who have completed Chinese II or equivalent
Objectives	This subject aims to further improve non-Chinese-speaking students' Chinese ability and oral communication skill in Chinese by expanding the vocabulary and mastering more sentence structures.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: - Further cultivate their Putonghua communicative ability and handle basic daily conversation; - Recognize 100 new characters; - Understand and use 250 new words; - Use basic Chinese sentence structures to create short narratives; - Handle Chinese character input.
Subject Synopsis/ Indicative Syllabus	Syllabus: - Pronunciation and Intonation - Vocabularies, Expressions and Grammar - Speaking Skills - Colloquial Expressions vs. Formal Expressions - Conversation on familiar matters regularly encountered in work, school, leisure, etc. - Sentence Writing - Further Practice of Character Input
Teaching/Learning Methodology	Teaching and learning activities will be in the form of interactive seminars where students will be given a lot of chances to practice. After class consultation forms another major element to maximize communications between students and teachers.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Dictation	10%		√	√		
	2. Vocabulary and Grammar Practice	10%		√	√	√	
	3. Oral Practice	30%	√	√	√	√	
	4. Writing Practice	40%	√	√	√	√	√
	5. In-class Participation	10%	√	√	√	√	√
	Total (Continuous Assessment)	100 %					
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:							
The assessment methods aim to:							
(1) Understand the meaning of conversation in actual communicative settings and paragraph;							
(2) Conduct a presentation on given topics and give the proper answers to the questions raised by teacher;							
(3) Conduct a dialogue in designed situations in Chinese;							
(4) Master the vocabulary and sentence patterns learned; and							
(5) Read and write Chinese passage.							
All assignments are in continuous assessment. Each assignment will be evaluated in terms of criterion reference assessment.							
Student Study Effort Expected	Class contact:						
	• Seminar		39 Hours				
	Other student study effort:						
	• Outside Class Practice		42 Hours				
	• Self-study		42 Hours				
	Total student study effort:		123 Hours				
Reading List and References	Textbook: 劉珣主編：《新實用漢語課本》第二冊 (New Practical Chinese Reader) (Vol.2)，北京語言大學出版社，2007 年。						
Last Updated	July 2016						
Prepared by	CBS Department						

Subject Description Form

Subject Code	CBS2152
Subject Title	Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students) 中國文學、語言與文化面面觀（非華語學生課程）
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	For non-Chinese speaking students at higher competence levels
Objectives	This subject aims to provide non-Chinese speaking students with Chinese training in twofold: (1) linguistic knowledge in Chinese language, Chinese literature and some inherent cultural subjects; (2) more advanced level vocabularies and expression structures for listening, speaking, reading and writing skills in Modern Standard Chinese.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Acquire a basic understanding of the basic features and varieties of the Chinese language; 2. Master 2400 useful Chinese words altogether; 3. Recognize 900 Chinese characters altogether; 4. Understand how Chinese culture affects the Chinese language; 5. Attain some basic knowledge of the major genres of the Chinese literature; 6. Understand the underlying aesthetic and cultural values through Chinese operas, Chinese calligraphy and Chinese painting; 7. Acquire the spirits of Confucianism and Daoism as manifested in some great works of the Chinese literature.
Subject Synopsis/ Indicative Syllabus	• Chinese language and Chinese dialects • Chinese cuisine-cultural perspective • Major genres of Chinese literature • Chinese myths and Chinese folklores • Varieties of Chinese opera • Main streams of Chinese philosophy and religion
Teaching/Learning Methodology	The subject will be delivered in mass lectures, group discussion and presentation. The course will be using different forms of teaching materials such as movie clip, real life conversations, art performances etc. for illustrations. Students will be required to conduct some simple and basic research in a given topic related to the subject matter. They will be asked to present their findings during tutorials as well as in a term paper.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)						
			1	2	3	4	5	6	7
	1. Oral Presentation	25%		√			√	√	√
	2. Dictation	10%	√	√	√				
	3. Essays	30%	√	√	√	√	√	√	√
	4. Final Test	25%	√	√	√	√	√	√	√
	5. In-class Participation	10%	√	√	√	√	√	√	√
	Total (Continuous Assessment)	100 %							
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:									
The assessment takes a criterion-referenced approach for all the required tasks. The areas of evaluation cover non-Chinese students' language abilities, their understanding of Chinese language, literature and the inherent cultural phenomenon as manifested in their viewpoints and ways of expression.									
Student Study Effort Expected	Class contact:								
	• Seminar							39 Hours	
	• Other student study effort:								
	• Assignment / Quiz							10 Hours	
	• Self-study							63 Hours	
	Total student study effort:							112 Hours	
Reading List and References	Textbook:								
	劉珣主編：《新實用漢語課本》第三冊 (New Practical Chinese Reader) (Vol.3)，北京語言大學出版社，2007 年。								
Reading List and References	Reference:								
	1. 史迹、陳越編：《文化全景：中級漢語教程》，高等教育出版社，第 1 版，2009 年 10 月 1 日。 2. 王海龍著：《解讀中國：中國文化閱讀教程 2》，北京大學出版社，第 1 版，2008 年 1 月 1 日。 3. 王海龍著：《文化中國：中國文化閱讀教程 1》，北京大學出版社，第 1 版，2002 年 8 月 1 日。 4. Chih-p'ng Chou, Wei Wang & Joanne Chiang: Readings in Contemporary Chinese Cinema: A Textbook of Advanced Modern Chinese (中國側影), Princeton University, 2005. 5. Jianhua Bai, Juyu Sung, Hesheng Zhang: Across the Straits (兩岸對話), Cheng & Tsui, June 1, 1999.								
Last Updated	July 2016								
Prepared by	CBS Department								

Subject Description Form

Subject Code	CBS2153
Subject Title	Intermediate Cantonese (Taught in English) 中級廣東話（以英語授課）
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Successful completion of CBS1153 [Elementary Cantonese (Taught in English)] or CBS 1153P [Elementary Cantonese (Taught in Putonghua)] or meet a certain standard in a pre-course assessment.
Objectives	This subject aims to enhance the ability of students to listen and speak Cantonese for communicative tasks of considerable complexity.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Pronounce accurately by better management of the tones of Cantonese; 2. Use more vocabulary and different sentence patterns to conduct communicative tasks including negotiation and giving instructions; 3. Comprehend simple messages conveyed in Cantonese; 4. Use simple Cantonese idiom/slang; 5. Recognize often used Chinese Characters in Cantonese.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. Revision of Yue Pin (Jyutping) System; 2. Comparing the pronunciation of English and Cantonese in order to have better management of tones of Cantonese; 3. Communicative tasks: buying and bargaining, asking for direction, taking public transportation, etc. 4. Teaching the meaning, usage and pronunciation of simple Cantonese idioms/slang; 5. Using Cantonese to complete an oral presentation of a field -trip experience; 6. Dictation
Teaching/Learning Methodology	Teaching and learning activities will be in the form of interactive seminars where students will be given a lot of chances to practice. After class consultation forms another major element to maximize communications between students and teachers.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Listening practice	40%	✓		✓	✓	
	2. Oral presentation	40%	✓		✓	✓	✓
	3. Class attendance & class performance	20%	✓	✓	✓		✓
	4. Total (Continuous Assessment)	100 %					
Student Study Effort Expected	Class contact:						
	▪ Seminar					39 Hours	
	Other student study effort:						
	▪ outside class practice					39 Hours	
	▪ self-study					39 Hours	
	Total student study effort:					117 Hours	
Reading List and References	Textbook:						
	1. Bun-Ching Chow (2013) Cantonese for Everyone (Jyutping version), The Commercial Press. 2. Yip, Virginia and Stephen Matthews (2001) Intermediate Cantonese: A Grammar and Workbook. Routledge, xiv+200pp, hardback ISBN 0-415-19386-9, Routledge Grammars. 3. Yip, Virginia and Stephen Matthews (2000) Basic Cantonese: A Grammar and Workbook. London: Routledge. 4. Bauer, Robert S. & Paul K. Benedict (1997) Modern Cantonese Phonology. Berlin: Mouton de Gruyter. 5. Kwan Choi Wah (1996) The Right Word in Cantonese (Enlarged Edition). Hong Kong: The Commercial Press. 6. Lo Wood Wai & Tam Fee Yin (1996) _Interesting Colloquial Cantonese Expressions. Hong Kong: The Chinese University Press. 7. Matthews, Stephen, & Virginia Yip (1994) Cantonese: A Comprehensive Grammar. London: Routledge. 8. Tong, Keith S. T., & Gregory James (1994) Colloquial Cantonese: A Complete Language Course. London: Routledge. 9. Kwan Choi Wah, et al. (1991) English-Cantonese Dictionary: Cantonese in Yale Romanization. Hong Kong: New Asia--Yale-in-China Chinese Language Center, The Chinese University of Hong Kong. 10. Chik Hon Man & Ng Lam Sim Yuk (1989) Chinese-English Dictionary: Cantonese in Yale Romanization; Mandarin in Pinyin. Hong Kong: New Asia--Yale-in-China Chinese Language Center, The Chinese University of Hong Kong.						
Last Updated	July 2016						
Prepared by	CBS Department						

Subject Description Form

Subject Code	CBS2154																																																				
Subject Title	Chinese IV (for Non-Chinese speaking students) 漢語 IV (非華語學生課程)																																																				
Credit Value	3																																																				
Level	2																																																				
Pre-requisite/ Co-requisite/ Exclusion	- For non-Chinese students at intermediate competence levels; and - Students who have completed Chinese III or equivalent																																																				
Objectives	This subject aims to further enhance non-Chinese-speaking students' oral communication skill in Chinese and their ability in reading and writing with Chinese characters.																																																				
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: - Master 1200 useful Chinese words altogether; - Recognize 600 Chinese characters altogether; - Master basic grammar patterns and related expressions; - Read and write passage in Chinese.																																																				
Subject Synopsis/ Indicative Syllabus	Syllabus: - Intonation - Grammar - Colloquial expressions vs. formal expressions - Pragmatics rules and implication - Cultural background of China reflected in expressions - Conversation on topics of personal interest such as dreams, hopes and ambitions, etc. - Writing passage in Chinese																																																				
Teaching/Learning Methodology	Teaching and learning activities will be in the form of interactive seminars where students will be given a lot of chances to practice. They will be encouraged to participate in after class consultation and to take part in authentic language activities to maximize communications between students and teachers.																																																				
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>1. Listening practice</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr> <tr> <td>2. Vocabulary and grammar practice</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr> <tr> <td>3. Oral presentation</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr> <tr> <td>4. Writing practice</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr> <tr> <td>5. Reading and Speaking</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr> <tr> <td>6. In-class participation</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr> <tr> <td>Total (Continuous Assessment)</td><td>100%</td><td colspan="4"></td></tr> </tbody> </table>	Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				1	2	3	4	1. Listening practice	10%	✓	✓	✓		2. Vocabulary and grammar practice	10%	✓	✓	✓	✓	3. Oral presentation	20%	✓	✓	✓		4. Writing practice	30%	✓	✓	✓	✓	5. Reading and Speaking	20%	✓	✓	✓	✓	6. In-class participation	10%	✓	✓	✓	✓	Total (Continuous Assessment)	100%				
Specific Assessment Methods/Tasks	% weighting			Intended subject learning outcomes to be assessed (Please tick as appropriate)																																																	
		1	2	3	4																																																
1. Listening practice	10%	✓	✓	✓																																																	
2. Vocabulary and grammar practice	10%	✓	✓	✓	✓																																																
3. Oral presentation	20%	✓	✓	✓																																																	
4. Writing practice	30%	✓	✓	✓	✓																																																
5. Reading and Speaking	20%	✓	✓	✓	✓																																																
6. In-class participation	10%	✓	✓	✓	✓																																																
Total (Continuous Assessment)	100%																																																				

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Building up vocabulary and grammar capacity is an important outcome of this subject. Students should endeavor to acquire the targeted number and range of vocabularies as well as grammar patterns. Such requirement is embedded in all the assessment items listed below. 1. Listening practice Students are asked to listen to dialogues and short passages and give answers in written Chinese to questions about the content so as to demonstrate their level of aural competency. 2. Vocabulary and grammar practice Although knowledge of Chinese characters, words and grammar patterns are emphasized throughout the course of learning, and the acquisition of such underlies all the assessments, students' performance in vocabulary and grammar will be separately assessed so as to show the importance of such knowledge. For instance, they will be asked to write sentences with given vocabulary and to correct sentences with grammatical errors. 3. Oral presentation Students are asked to make presentation on a book they like or their dreams/hopes/ambition or an interesting thing they want to share with the class. They have to give spontaneous responses to questions on their presentations so as to demonstrate the ability to engage in simple conversation. 4. Writing practice Students are asked to write two compositions on daily life topics so as to demonstrate their mastery of some commonly used vocabularies, grammar patterns and ways of expressions. . 5. Reading and speaking Students are asked to read a narrative passage with about 200 characters and retell the content in spoken form afterward. They have to answer teacher's questions about the story as well. 6. In-class participation As the lessons are conducted in an interactive manner, discussions, short exercises and other learning activities are conducted during classes, and thus students' participation is assessed. All assignments are in the form continuous assessment. Each assignment will be evaluated with the criterion-reference approach.	
Student Study Effort Expected	Class contact:	
	• Seminar	39 Hours
	Other student study effort:	
	• outside class practice	36 Hours
	• self-study	36 Hours
	Total student study effort	111 Hours
Reading List and References	刘珣主编 (2007) 《新实用汉语课本》第二册 (<i>New Practical Chinese Reader</i>) (Vol.2), 北京语言大学出版社。	
Last Updated	August 2017	
Prepared by	CBS Department	

Subject Description Form

Subject Code	EE2002A / EE2002B
Subject Title	Circuit Analysis
Credit Value	3
Level	2
Pre-requisite	AP10006
Objectives	1. Introduce fundamental circuit theory. 2. Develop ability for solving problems involving electric circuits. 3. Develop skills for experimentation on electric circuits.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Acquire a good understanding of fundamental circuit theory. 2. Solve simple problems in electric circuits. 3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>DC Circuits</u> Introduction to electric circuits. Voltage and current as two basic variables. Kirchhoff's current and voltage laws. Independent and dependent sources. Simple circuit styles: voltage divider, current divider, series and parallel circuits. Nodal and mesh analyses. Thévenin and Norton theorems. Power dissipation. Source loading and maximum power transfer. 2. <u>Capacitance, Inductance and First Order Transients</u> Constitutive relations of capacitor and inductor. Introduction to time-varying circuits. Simple RC and LC circuits. Important concept of independent state variables. First-order differential equation (with simple solution of exponential form). First order transient analysis. Time-domain solution and transient behaviour of first order circuits. 3. <u>Steady-state Analysis of AC Circuits</u> Average and rms values. Phasors (rotating vectors). Steady-state analysis of circuits driven by single fixed frequency sinusoidal sources. Impedance and admittance. Analysis approach 1: phasor diagrams for simple circuits. Analysis approach 2: systematic complex number analysis, i.e., same treatment as DC circuits but with complex numbers representing phase and magnitude of AC voltages and currents. Real and reactive powers. Power factor. Three-phase circuits. 4. <u>Mutual Inductance and Transformer</u> Basic coupled inductance equation. Concept of ideal transformer (assuming sinusoidal voltages and currents). Dot convention. Physical transformer as ideal transformer with leakage and magnetizing inductances. Applications in galvanic isolation and voltage/current level conversion. 5. <u>Electrical Measurement</u> Measurement uncertainties. Resistance measurement: Four-probe measurement and Wheatstone Bridge. Capacitance and inductance measurement using AC Bridges. Power Measurement. Measuring three-phase power by two-wattmeter method.

	Laboratory Experiments: 1. Kirchhoff's laws and the maximum power transfer theorem 2. Transients in RC and RL circuits 3. AC Circuits and Transformer Tests				
Teaching/ Learning Methodology	Lectures, supplemented with interactive questions and answers, and short quizzes	1,2	In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A and short quizzes.		
	Tutorials, where problems are discussed and are given to students for them to solve	1,2	In tutorials, students <i>apply</i> what they have learnt in solving the problems given by the tutor.		
	Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	2,3	Students <i>acquire</i> hands-on experience in using electronic equipment and <i>apply</i> what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.		
	Assignment and Homework	1,2	Through working assignment and homework, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught.		
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/task	% Weighting	Intended Subject Learning Outcomes to be Assessed		
			1	2	3
	1. Continuous Assessment (Total 40%)				
	• Laboratory works and reports	20%		✓	✓
	• Mid-semester test	20%	✓	✓	
	2. Examination	60%	✓	✓	
	Total	100%			

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific assessment methods/task	Remark
	Assignment/ Homework	Assignments are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> . The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) 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 three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignment/homework.
	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.
	Examination	There will be an examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignment/homework.

Student Study Effort Expected	Class contact:	
	• Lecture	22 Hours
	• Tutorial	8 Hours
	• Laboratory	9 Hours
	Other student study effort:	
	• Revision and Assignments	40 Hours
	• Report Writing	18 Hours
	Total student study effort	97 Hours
Reading List and References	Textbook: 1. C.K. Alexander and M.N.O. Sadiku, Fundamentals of Electric Circuits, 6th Edition, New York: McGraw-Hill, 2017. References: 1. G. Rizzoni, Fundamentals of Electrical Engineering, First Edition, New York: McGraw-Hill, 2009. 2. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, Engineering Circuit Analysis, 8th ed., New York: McGraw-Hill, 2012. 3. A.H. Robbins and W.C. Miller, <i>Circuit Analysis: Theory and Practice</i>, Thomson Learning, 5th ed., 2013.	
Last Updated	June 2017	
Prepared by	EE Department	

Subject Description Form

Subject Code	EE2003A / EE2003B
Subject Title	Electronics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite for EE2003A: EE2002A Pre-requisite for EE2003B: EE2002B
Objectives	1. To introduce the principles and techniques used in the operations and analysis of fundamental classes of semiconductor-based electronic devices and circuits, including diodes and diode circuits, bipolar junction transistors (BJTs) and BJT amplifiers, metal-oxide-semiconductor field-effect transistors (MOSFETs) and MOSFET amplifiers as well as operational amplifiers (op-amps) and op-amp circuits. 2. To introduce the principles and techniques used in the implementation of frequency domain analysis on first-order ac circuits with sinusoidal driving sources.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Describe the operating principles of the fundamental classes of semiconductor based electronic devices and circuits. 2. Apply the appropriate techniques to analyze the fundamental classes of semiconductor-based electronic devices and circuits. 3. Implement the frequency domain analysis on first-order ac circuits with sinusoidal driving sources. 4. Conduct relevant laboratory experiments and report the findings with appropriate techniques and tools.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Diodes and Diode Circuits</u> Semiconductor materials and properties. Properties of p-n junctions. Structure, operation and characteristics of p-n junction diodes. Ideal and practical p-n junction diodes. Analysis of basic diode circuits. Analysis of specific diode circuits: rectifiers, peak detectors, clippers, clampers, etc. Load line concept and analysis. 2. <u>BJTs and BJT Amplifiers</u> Structures, operations and characteristics of n-p-n and p-n-p BJTs. DC analysis, load line and design techniques of BJT circuits. DC biasing schemes. Basic configurations, operations and characteristics of BJT amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect. 3. <u>MOSFETs and MOSFET Amplifiers</u> Structures, operations and characteristics of n-channel and p-channel MOSFETs. DC analysis, load line and design techniques of MOSFET circuits. DC biasing schemes. Basic configurations, operations and characteristics of MOSFET amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect. 4. <u>Op-Amps and Op-Amp Circuits</u> Transistor-level diagram and basic operation of op-amps. Ideal and practical

	op-amp equivalent circuits and characteristics. Golden rules. Basic op-amp circuits: inverting, non-inverting, summing, difference, integrating and differentiating amplifiers. Specific op-amp circuits: voltage follower, current-to-voltage converter, voltage-to-current converter, instrumentation amplifier etc. Design applications. 5. <u>Frequency Domain Analysis</u> Power, voltage and current gains on linear and logarithmic scales. Concepts of “bel” and “decibel”. Concepts of time t, angular frequency $j\omega$ and complex angular frequency s domains. Transfer functions in $j\omega$ and s domains. Introduction to Bode plot. Derivation of transfer functions of first-order ac circuits with sinusoidal driving sources. Implementation of Bode magnitude and phase plots. Concepts of pole and zero, corner/cutoff frequency as well as bandwidth. Laboratory Experiments: - EE2003-E01: Basic Diode Circuits. - EE2003-E02: Design of a Small-Signal Common-Emitter BJT Amplifier. - EE2003-E03: Op-Amp Circuits.					
Teaching/ Learning Methodology	Lectures, supplemented with interactive questions and answers	1,2,3	In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A.			
	Tutorials, where problems are discussed and are given to students for them to solve	1,2,3	In tutorials, students <i>apply</i> what they have learnt in solving the problems given by the tutor.			
	Assignments	1,2,3	Through working assignments, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught.			
	Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	1,2,4	Students <i>acquire</i> hands-on experience in using electronic equipment and <i>apply</i> what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.			
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed			
			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:	
	Specific assessment methods/tasks	Remark
	Assignments	Assignments are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> . The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.
	Laboratory works and reports	Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignments.
	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 assignments.
	End-of-semester test and Examination	There will be an end-of-semester test and an examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.
Student Study Effort Expected	Class contact:	
	• Lecture	24 Hours
	• Tutorial	6 Hours
	• Laboratory	9 Hours
	Other student study effort:	
	• Self-study	41 Hours
	• Assignments	12 Hours
	• Laboratory logbook & report writings	8 Hours
	Total student study effort	100 Hours

Reading List and References	Textbook: 1. Donald A. Neamen, <i>Microelectronics: Circuit Analysis and Design</i>, 4th ed., Boston: McGraw-Hill, 2010. References: 1. G. Rizzoni and James Kearns, <i>Principles and Applications of Electrical Engineering</i>, 6th ed., New York: McGraw-Hill, 2015. 2. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, <i>Engineering Circuit Analysis</i>, 8th ed., New York: McGraw-Hill, 2012. 3. A.H. Robbins and W.C. Miller, <i>Circuit Analysis: Theory and Practice</i>, Thomson Learning, 5th ed., 2013.
Last Updated	June 2017
Prepared by	EE Department

Subject Description Form

Subject Code	EIE2100
Subject Title	Basic Circuit Analysis
Credit Value	3
Level	2
Pre-requisite	AP10006 Physics II
Co-requisite/ Exclusion	Nil
Objectives	1. Introduce fundamental circuit theory. 2. Develop ability for solving problems involving electric circuits. 3. Develop skills for experimentation on electric circuits. 4. Impart relevant skills and knowledge for independent learning of other subjects that require such skills and knowledge.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Acquire a good understanding of fundamental circuit theory. 2. Solve simple problems in electric circuits. 3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations. <u>Category B: Attributes for all-roundedness</u> 4. Search for useful information in solving problems in electric circuits.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Basic Concepts of Electricity</u> Static electricity, Conductors, insulators and electron flows. Concept of electric circuits. Voltage, current, and resistances in a practical circuit. 2. <u>DC Circuits</u> Introduction to electric circuits. Kirchhoff's current and voltage laws. Independent and dependent sources. Simple circuits: voltage divider, current divider, series and parallel circuits. Graphs. Trees & Co-trees. Cutsets & loops. Nodal and mesh analyses. Loop and cutset analyses of resistive circuits. Thévenin and Norton theorems. Power dissipation. Source loading and maximum power transfer. 3. <u>Capacitance, Inductance and First Order Transient</u> Constitutive relations of capacitor and inductor. Introduction to time-varying circuits. Simple RC and LC circuits. Important concept of independent state variables. First-order differential equation (with simple solution of exponential form). First order transient analysis. Time-domain solution and transient behaviour of first order circuits. 4. <u>Introduction to Transformers</u> Concept of ideal transformer (assuming sinusoidal voltages and currents). Dot convention. Physical transformer as ideal transformer with leakage and magnetizing inductances. Applications in galvanic isolation and voltage/current level conversion. 5. <u>Steady-state Analysis of AC Circuits</u> Average and rms values. Phasors (rotating vectors). Steady-state analysis of circuits driven by single fixed frequency sinusoidal sources. Impedance and admittance. Euler equation. Analysis approach 1: phasor diagrams for simple circuits. Analysis approach 2: systematic complex number analysis, i.e.,

	same treatment as DC circuits but with complex numbers representing phase and magnitude of AC voltages and currents. Real and reactive powers. Power factor. Simple three-phase circuits. 6. <u>Formulation of State Equations for General Dynamic Circuits</u> Choice of state variables using topological approach. Basic cutsets and loops. Derivation of state equations for general dynamic circuits. 7. <u>Operational Amplifiers</u> Ideal operational amplifier. Defining characteristics (i.e., infinite gain and infinite input resistance). Op-amp circuits: inverting amplifier, non-inverting amplifier, summer, difference amplifier, integrator and differentiator. Applications: instrumentation amplifier; current-to-voltage and voltage-to-current converters. Laboratory Experiments: 1. Introduction to laboratory instrumentation / Thévenin and Norton theorems 2. First order transient 3. Use of operational amplifiers.		
Teaching/ Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
	Lectures, supplemented with interactive questions and answers	1, 2, 4	In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A.
	Tutorials, where problems are discussed and are given to students for them to solve	1, 2, 4	In tutorials, students <i>apply</i> what they have learnt in solving the problems given by the tutor.
	Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	2, 3, 4	Students <i>acquire</i> hands-on experience in using electronic equipment and <i>apply</i> what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.
	Assignments	1, 2, 3, 4	Through working assignments, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught.

Alignment of Assessment and Intended Learning Outcomes	Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
			1	2	3	4
	1. Continuous Assessment (Total 40%)					
	• Assignments	10%	✓	✓		✓
	• Laboratory works and reports	10%		✓	✓	✓
	• Mid-semester test	10%	✓	✓		✓
	• End-of-semester test	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					
Assignments	Assignments are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> . The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.					
Laboratory works and reports	Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignments.					
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 assignments.					
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. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.					

Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbook: 1. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, <i>Engineering Circuit Analysis</i>, 7th ed., New York: McGraw-Hill, 2006. 2. G. Rizzoni, <i>Fundamentals of Electrical Engineering</i>, 1st ed., McGraw-Hill, 2009. References: 1. C.K. Tse, <i>Linear Circuit Analysis</i>, London: Addison-Wesley, 1998. 2. D.A. Neamen, <i>Micoelectronics: Circuit Analysis and Design</i>, Boston: McGraw-Hill, 3rd ed., 2007. 3. R.A. DeCarlo and P.M. Lin, <i>Linear Circuit Analysis</i>, 2nd ed., Oxford University Press, 2001. 4. A.H. Robbins and W.C. Miller, <i>Circuit Analysis: Theory and Practice</i>, Thomson Learning, 4th ed., 2006.	
Last Updated	March 2015	
Prepared by	Dr Y.M. Lai	

Subject Description Form

Subject Code	EIE2102
Subject Title	Basic Electronics
Credit Value	3
Level	2
Pre-requisite	<u>For 42470:</u> EIE2100 Basic Circuit Analysis <u>For 42375:</u> EIE2101 Basic Circuit Analysis
Co-requisite/ Exclusion	Nil
Objectives	To introduce the operating principles of electronic circuits. Several classes of electronic circuits will be covered in this subject – diode circuits, BJT transistor circuits, FET transistor circuits. An introduction to power amplifiers will also be given.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Acquire some understanding in the fundamental electric and electronics principles. 2. Solve basic problems in electric and electronic circuits. 3. Acquire better skills in performing the laboratory experiments. <u>Category B: Attributes for all-roundedness</u> 4. Perform independent learning in basic electric and electronic principles. 5. Work as a team in laboratory sessions.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Load Line Analysis and Diode Circuits</u> I-V characteristics of diodes and general nonlinear components. DC solution based on load line construction. Practical diode circuits: rectifier circuits, clipping and clamping circuits. 2. <u>Transistors and Biasing Circuits</u> The bipolar junction transistors (BJT). DC biasing and analysis of BJT circuits. Metal-oxide-semiconductor field-effect transistor (MOSFET). DC biasing and analysis of MOSFET circuits. Load line and graphical large-signal analysis. Transistor amplification concept. 3. <u>Transistor Amplifiers and Small-signal Concepts</u> Basic BJT and MOSFET amplifier configurations: common emitter and common source configurations. Small-signal models and parameters with reference to two-port networks. Concept of transconductance. Voltage gain. Input and output impedances. Introduction to loading effect. 4. <u>Introduction to Frequency Domain Analysis</u> Transfer functions from ac circuits in terms of $j\omega$. Introduction to frequency domain, from $j\omega$ to s. General s-domain transfer functions. Simple first-order filter circuits. Introducing concepts of pole, corner frequency, bandwidth. For sinusoidal driving sources, use of $j\omega$ axis for magnitude and phase plots. Extension to asymptotic plots and hence Bode plots.

	5. <u>Fundamentals of Power Amplifiers</u> Concept of conversion efficiency. Class A, Class B & Class AB operations of power amplifiers and the related circuits. Laboratory Experiments: 1. DC transistor biasing/load line and diode clamping circuits. 2. Transistor amplifier circuits. 3. Design of a simple transistor amplifier. 4. OCL class AB power amplifier.							
Teaching/ Learning Methodology	Teaching and Learning Method		Intended Subject Learning Outcome		Remarks			
	Lectures, supplemented with interactive questions and answers		1, 2, 4		In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A.			
	Tutorials, where problems are discussed and are given to students for them to solve		1, 2, 4		In tutorials, students <i>apply</i> what they have learnt in solving the problems given by the tutor.			
	Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.		2, 3, 5		Students <i>acquire</i> hands-on experience in using electronic equipment and <i>apply</i> what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.			
	Assignments, mini-project		1, 2, 3, 4		Through working assignments, mini-project, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught.			
Assessment Methods in Alignment with Intended 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			✓	✓	✓	✓	✓
	Assignment		13%					
	Test		13%					
		Lab	14%					
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	Assignments are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> . The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.
	Laboratory works and reports	Students will be required to perform four experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignments.
	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 assignments.
	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. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbook: 1. G. Rizzoni, <i>Fundamentals of Electrical Engineering</i> , 1 st ed., McGraw-Hill, 2009. References: 1. D.A. Neamen, <i>Micoelectronics: Circuit Analysis and Design</i> , Boston: McGraw-Hill, 3 rd ed., 2007. 2. A.H. Robbins and W.C. Miller, <i>Circuit Analysis: Theory and Practice</i> , Thomson Learning, 4 th ed., 2006.	
Last Updated	May 2018	
Prepared by	Dr S.C. Wong	

Subject Description Form

Subject Code	EIE2211
Subject Title	Logic Design
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with a broad view in both hardware and software aspects of digital systems in general and microprocessor systems in particular, and enable them to gain understanding and skills that will be used in later computer related courses. Emphasis will be placed on topics including: 1. Common binary logic components found in a microcomputer system 2. Use and applications of programmable logic devices 3. Structure and organization of microprocessors
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 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. <u>Category B: Attributes for all-roundedness</u> 5. Think critically.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Logic Circuit and ICs</u> 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. <u>Memory and Programmable Logic Devices</u> 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. <u>Microprocessor</u> 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				
Assessment Methods in Alignment with 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	50%					
	• Assignments		✓	✓			
	- homework	15%					
	- Class question/ participation	5%					
	• Test	20%	✓	✓	✓	✓	
	• Laboratory sessions	10%	✓	✓	✓	✓	✓
	2. Examination	50%	✓	✓	✓	✓	
	Total	100%					

	The continuous assessment will consist of a number of assignment, lab reports, and two tests.							
	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>Assignments, tests and examination</td><td>End-of chapter type problems used to evaluate students' ability in applying concepts and skills learned in the lessons. Students need to think critically and creatively in order to come up with solutions for existing problems.</td></tr><tr><td>Laboratory sessions</td><td>Each student is required to do a demonstration.</td></tr></table>	Specific Assessment Methods/Tasks	Remark	Assignments, tests and examination	End-of chapter type problems used to evaluate students' ability in applying concepts and skills learned in the lessons. Students need to think critically and creatively in order to come up with solutions for existing problems.	Laboratory sessions	Each student is required to do a demonstration.	
Specific Assessment Methods/Tasks	Remark							
Assignments, tests and examination	End-of chapter type problems used to evaluate students' ability in applying concepts and skills learned in the lessons. Students need to think critically and creatively in order to come up with solutions for existing problems.							
Laboratory sessions	Each student is required to do a demonstration.							
Student Study Effort Expected	Class contact (time-tabled):							
	• Lecture	24 Hours						
	• Tutorial/Laboratory/Practice Classes	15 hours						
	Other student study effort:							
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours						
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours						
	Total student study effort:	105 Hours						
Reading List and References	Textbooks: 1. M.M. Mano and C.R. Kime, <i>Logic and Computer Design Fundamentals</i> , 4 th ed., Upper Saddle River, NJ: Prentice-Hall, 2008. Reference Books: 1. M.M. Mano and M.D. Ciletti, <i>Digital Design</i> . Upper Saddle River, NJ: Prentice-Hall, 2007. 2. S. Yalamanchili, <i>VHDL – A Starter's Guide</i> , 2 nd ed. Prentice-Hall, 2005. 3. E.O. Hwang, <i>Digital Logic and Microprocessor Design With VHDL</i> , 1 st ed., CL-Engineering, 2006.							
Last Updated	February 2018							
Prepared by	Dr Gang Li							

Subject Description Form

Subject Code	ELC2011
Subject Title	Advanced English Reading and Writing Skills
Credit Value	3
Level	2
Pre-requisite	ELC1012 or ELC1013 English for University Studies
Objectives	This subject aims to help students become more effective readers and writers. It focuses on developing students' facility to read a variety of texts in a critical manner, both intensively and extensively; and to write texts that demonstrate knowledge and insight.
Intended Subject Learning Outcomes	Upon successful completion of the subject, students will be able to examine a variety of texts, including literary texts, and: 1. Reflect on and critically analyze texts of different genres and styles, identifying the writer's aims and stance 2. Identify and evaluate language used to make claims and support these with valid arguments 3. Write a text on a chosen topic that includes their opinion and interpretation of some key issues and demonstrates critical thinking and creativity
Subject Synopsis / Indicative Syllabus	Reading strategies Reading extensively to appreciate the use of language, acquire information, promote understanding, and develop empathy. Reading intensively to investigate a particular topic and develop an in-depth understanding of issues and stances. Reading critically to extract implications, identify writers' assumptions and purposes, and analyze issues raised in texts written from different perspectives. Writing strategies Describing and analyzing the structure, meaning and characteristics of a variety of texts. Presenting views and arguments to educated readers with sophisticated language and appropriate visual images and formats.
Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended learning approach, activities include teacher input as well as in- and out-of-class work involving sharing and discussion of reading experiences; and reading, evaluating and drafting texts. The process approach to writing is adopted, and students make use of e-learning resources to engage in discussions and to reflect on their learning. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			1	2	3
	1. Reflective writing	20%	✓		
	2. Analyzing genres of writing	40%	✓	✓	
	3. Feature article writing	40%			✓
	Total	100%			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assessment 1 requires students to write a reflection after reading a range of literary genres and sharing their ideas in class; and is aligned with ILO (1). Assessment 2 (an in-class assessment) requires students to employ effective critical reading and thinking skills to interpret texts, identify the writer's style and stance, and evaluate the choice of language used; and is aligned with ILOs (1) and (2). Assessment 3 requires students to first conduct research and gain some insight into a particular topic, then produce an article which can inform and impress readers through its substance, structure and language; and is aligned with ILO (3). Through these assessments, students will be able to develop and demonstrate more advanced reading and writing skills.				
Student Study Effort Expected	Class contact:				
	Seminars		39 Hours		
	Other student study effort:				
	Online forums and blogs Readings and sharing session preparation Research and drafting/revising of texts		78 Hours		
	Total student study effort:		117 Hours		
Reading List and References	Course material: Learning materials developed by the English Language Centre				
	Recommended references: 1. Best, J. (2001). <i>Damned lies and statistics: Untangling numbers from the media, politicians, and activists</i> . Berkeley, CA: University of California Press. 2. Cooper, S. & Patton, R. (2010). <i>Writing logically, thinking critically</i> . New York, NY: Longman. 3. Damer, T. E. (2009). <i>Attacking faulty reasoning: A practical guide to fallacy-free arguments</i> . Belmont, CA: Wadsworth Cengage Learning. 4. Kennedy, X. J. & Gioia, D. (2010). <i>Literature: An introduction to fiction, poetry, drama, and writing</i> (11 th ed.). New York, NY: Longman. 5. Mefcalfe, M. (2006). <i>Reading critically at university</i> . Thousand Oaks, CA: Sage.				
Last Updated	July 2018				
Prepared by	English Language Centre				

Subject Description Form

Subject Code	ELC2012
Subject Title	Persuasive Communication
Credit Value	3
Level	2
Pre-requisite	ELC1012 or ELC1013 English for University Studies
Objectives	This subject aims to help students become more persuasive communicators in a variety of contexts that they may encounter at university and in the workplace.
Intended Subject Learning Outcomes	By the end of the subject, students should be able to communicate effectively in an English-medium environment through: 1. Writing persuasive texts intended for a variety of audiences 2. Communicating persuasively in oral contexts 3. Make persuasive arguments in formal discussions To achieve these, students are expected to use language and text structure appropriate to the context, select information critically, and present and support stance and opinion.
Subject Synopsis/ Indicative Syllabus	1. Preparing for effective persuasion Assessing the situation; selecting relevant content; organising ideas and information; selecting an appropriate tone, distance and level of formality to support the communication of messages. 2. Persuasion through writing Developing and practising appropriate language, tone, style and structure; achieving cohesion and coherence. 3. Persuasion through speaking Developing and practising appropriate verbal and non-verbal skills for persuasive oral communication; improving and extending relevant pronunciation features, including articulation, pausing, intonation, word stress and sentence stress.
Teaching/Learning Methodology	The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving reading and appreciating texts, discussions and presentations of ideas. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			1	2	3
	1. Speech	30%		✓	
	2. Persuasive written text	40%	✓		
	3. Debate	30%		✓	✓
	Total	100 %			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assessment 1 is an individual speech. Assessment 2 concentrates on persuasive writing. Assessment 3 examines a different aspect of persuasion, the debate.				
Student Study Effort Expected	Class contact:				
	• Seminars		39 Hours		
	Other student study effort:				
	• Self study/preparation		78 Hours		
	Total student study effort:		117 Hours		
Reading List and References	Required readings: ELC-provided subject materials. Other readings: 1. Breaden, B. L. (1996). <i>Speaking to persuade</i> . Fort Worth, TX: Harcourt Brace College. 2. Covino, W.A. (1998). <i>The elements of persuasion</i> . Boston: Allyn and Bacon. 3. Edwards, R. E. (2008). <i>Competitive debate: The official guide</i> . New York: Alpha Books. 4. Leanne, S. (2008). <i>Say it like Obama: The power of speaking with purpose and vision</i> . New York: McGraw Hill. 5. Rogers, W. (2007). <i>Persuasion: messages, receivers, and contexts</i> . Lanham, MD: Rowman & Littlefield Publishers. 6. Stiff, J. B. (2003). <i>Persuasive communication</i> (2nd ed.). New York: Guilford Press.				
Last Updated	July 2018				
Prepared by	English Language Centre				

Subject Description Form

Subject Code	ELC2013
Subject Title	English in Literature and Film
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: English for University Studies (ELC1012/1013)
Objectives	This subject aims to introduce students to a range of literary genres in English as well as to enable them to consider differences in media representations of genres, and to appreciate and negotiate the meanings of a variety of literary texts. It is also intended that the subject will help students further develop literacy, as well as higher order thinking and life-long learning skills.
Intended Subject Learning Outcomes	Upon successful completion of the subject, students will be able to: 1. Examine and analyse literary texts from different perspectives 2. Discuss literary techniques employed by writers 3. Appreciate and articulate differences in textual and visual media representations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present and support stance and opinion.
Subject Synopsis/ Indicative Syllabus	1. Written communication Describing and interpreting content and language in literary texts; employing appropriate grammatical structures and vocabulary. 2. Spoken communication Presenting critical evaluation of literary works effectively and convincingly. 3. Reading Developing understanding of and competence in using literary devices such as metaphor, simile and symbolism, via reading literary texts and viewing film versions. 4. Language development Improving fluency and pronunciation, and extending grammatical and lexical competence.
Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving listening to and viewing a variety of audio-visual sources, reading and drafting texts, conducting internet research, making mini-presentations, participating in discussions, and comparing various representations of literature. Students will make use of elearning resources and web-based work to further improve their English literacy skills. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			1	2	3
	1. Individual Essay	40%	✓	✓	
	2. Group Presentation	30%	✓	✓	✓
	3. Individual Project	30%	✓	✓	✓
	Total	100 %			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: In assessment 1, students are required to write an individual paper in which they critically reflect on their reading of prose, and by so doing, demonstrate their achievement of LO (1). Assessments 2 and 3 are aligned with all three LOs. Assessment 2 assesses students' understanding of a literary drama and requires comparison of the merits of its textual and theatrical versions. Assessment 3 is an individual project that requires interpretation and presentation of more creative literature and audio-visual sources.				
Student Study Effort Expected	Class contact:				
	• Seminars		39 Hours		
	Other student study effort:				
	• Self study/preparation		78 Hours		
	Total student study effort:		117 Hours		
Reading List and References	Recommended reading: The PolyU library retains either hardcopies or electronic copies of the following titles. The titles can also be found online. Stam, R., and Raengo, A. (eds.). (2004). <i>A companion to literature and film</i> . [electronic source] Blackwell reference online. Malden: Blackwell. Call number PN1995.3.C65 2004eb http://www.blackwellreference.com/subscriber/uid=262/book?id=g9780631230533_9780631230533&authstatuscode=202 Other readings will be specified by the ELC teacher, and may contain short fiction, novelettes, plays and poetry.				
Last Updated	July 2018				
Prepared by	English Language Centre				

Subject Description Form

Subject Code	ELC2014
Subject Title	Advanced English for University Studies
Credit Value	3
Level	2
Pre-requisite	ELC1012 or ELC1013 English for University Studies (unless exempted)
Objectives	This subject aims to help students study effectively in the University's English medium learning environment, and to improve and develop their English language proficiency within a framework of university study contexts.
Intended Subject Learning Outcomes	Upon successful completion of the subject, students will be able to: 1. Research relevant academic texts for a topic and integrate the sources into a position argument essay appropriately and effectively; 2. Plan, research for, write and revise a position argument essay; and 3. Present and justify views effectively in a mini oral defence. To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present and support stance and opinion logically and persuasively.
Subject Synopsis/ Indicative Syllabus	1. Written communication Developing logical and persuasive arguments; applying a variety of organisation patterns in discursive writing, including the writing of explanatory and evaluative texts; selecting information from academic texts critically; supporting stance; maintaining cohesion and coherence in discursive writing; achieving appropriate style and tone. 2. Spoken communication Enhancing and practising the specific oral and aural skills required to participate effectively in an academic discussion and to present and justify views in an oral defence. 3. Reading and listening Understanding the content and structure of information in oral and written texts; comprehending, inferring and evaluating messages and attitude. 4. Language development Improving and extending relevant features of grammar, vocabulary and pronunciation.
Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of elearning resources to engage in academic discussions and to reflect on their learning. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
				1	2	3
	1. Position Argument Essay (draft)		20%	✓	✓	
	2. Academic Presentation & discussion		35%	✓		✓
	3. Position Argument Essay (final)		45%	✓	✓	
	Total		100 %			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assessments 1 and 3 assess students’ abilities to produce a coherent academic text which requires research, and effective use and referencing of sources (ref. LOs (1) and (2)). Assessment 2 assesses their abilities to plan, present and justify their views in an oral defence (ref. LOs (1) and (3)). In addition to their assessments, students complete further language training by carrying out academic research and by completing a variety of independent-learning tasks focusing on grammar and academic skills such as paraphrasing and discussion strategies.					
Student Study Effort Expected	Class contact:					
	• Seminars			39 Hours		
	Other student study effort:					
	• Self study/preparation			78 Hours		
	Total student study effort:			117 Hours		
Reading List and References	Course material: Learning materials developed by the English Language Centre					
	Recommended references: 1. Davies, B. (2012). <i>Reading research: A user friendly guide for health professionals</i> (5th ed.). Toronto, ON: Elsevier Canada. 2. Faigley, L. (2012). <i>Backpack writing: Reflecting, arguing, informing, analyzing, evaluating</i> (3rd ed.). Boston, MA: Pearson. 3. Madden, C. and Rohlck, T. N. (1997). <i>Discussion and interaction in the academic community</i>. Ann Arbor, MI: University of Michigan Press. 4. McWhorter, K. T. (2007). <i>Academic reading</i> (6th ed.). New York, NY: Pearson/Longman 5. Oshima, A. & Hogue, A. (2006). <i>Writing academic English</i> (4th ed.). White Plains, NY: Pearson/Longman. 6. Reinhart, S. M. (2013). <i>Giving academic presentations</i> (2nd ed.). Ann Arbor, MI: University of Michigan Press. 7. Rost, M. (2013). <i>Active listening</i>. Harlow, England: Pearson. 8. Wood, N. V. (2012). <i>Perspectives on argument</i> (7th ed.). Boston, MA: Pearson.					
Last Updated	July 2018					
Prepared by	English Language Centre					

Subject Description Form

Subject Code	ENG2001
Subject Title	Fundamentals of Materials Science and Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To realize the impact of the development of engineering materials on human civilization; 2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems. 3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in service performance.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Comprehend the importance of materials in engineering and society; 2. Explain the properties and behaviour of materials using fundamental knowledge of materials science; 3. Apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials; 4. Select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction</u> Historical perspective; Evolution of engineering materials; Materials science and engineering; Classification of materials 2. <u>Atomic Structure and Structures of Materials</u> Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystalline and non-crystalline materials; Phase diagram and microstructure of alloys 3. <u>Electrical and Optical Properties of Materials</u> Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and photovoltaics; Light propagation in optical fibers; Liquid crystal; Photoelasticity 4. <u>Mechanical Properties of Materials</u> Concept of stress and strain; Stress-strain behaviour; Elastic and plastic properties of materials; Concepts of dislocations and strengthening mechanisms; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Impact energy, Fracture toughness; Design and safety factors 5. <u>Introduction to Failure Analysis and Prevention</u> Fundamentals of fracture: ductile, brittle, fatigue and creep; Corrosion; Nondestructive testing; Techniques for failure analysis and prevention 6. <u>Selection of Engineering Materials</u> Characteristics of metallic, polymeric, ceramic, electronic and composite materials; Economic, environmental and recycling issues

Teaching/Learning Methodology	The subject will be delivered mainly through lectures but tutorials, case studies and laboratory work will substantially supplement which. Practical problems and case studies of material applications will be raised as a focal point for discussion in tutorial classes, also laboratory sessions will be used to illustrate and assimilate some fundamental principles of materials science. The subject emphasizes on developing students' problem solving skills.					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
			1	2	3	4
	1. Assignments	15%	√	√	√	√
	2. Test	20%		√	√	√
	3. Laboratory report	5%		√	√	
	4. Examination	60%		√	√	√
	Total	100 %				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assignments are designed to reflect students' understanding of the subject and to assist them in self-monitoring of their progress. The laboratory report is designed to assess the capability of students in analyzing and reporting experimental data relates to learning outcome (2). The test and examination are for determining students' understanding of key concepts as well as for assessing their achievement of the learning outcomes.					
Student Study Effort Expected	Class contact:					
	• Lectures, tutorials, practical			39 Hours		
	Other student study effort:					
	• Guided reading, assignments and reports			37 Hours		
	• Self-study and preparation for test and examination			47 Hours		
	Total student study effort:			123 Hours		
Reading List and References	1. William D. Callister, Jr., David G. Rethwisch, <i>Fundamentals of materials science and engineering</i> , 4 th ed., E-Text John Wiley & Sons; ISBN: 978-1-118-53126-6 2. William D. Callister, Jr., David G. Rethwisch, <i>Materials Science and Engineering</i> , 8 th ed., E-Text John Wiley & Sons; ISBN: 978-1-118-37325-5 3. Materials World (Magazine of the Institute of Materials, Minerals and Mining)					
Last Updated	July 2016					
Prepared by	Faculty of Engineering					

Subject Description Form

Subject Code	ENG2002
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	(i) To introduce the fundamental concepts of computer programming (ii) To equip students with sound skills in C/C++ programming language (iii) To equip students with techniques for developing structured and object-oriented computer programs (iv) 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: 1. Familiarize themselves with at least one C/C++ programming environment. 2. Be proficient in using the basic constructs of C/C++ to develop a computer program. 3. 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. Apply computer programming techniques to solve practical engineering problems.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. Introduction to programming - Components of a computer; Programming environment; Process of application development. 2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators. 3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables. 4. Program Design and Debugging - Structured program design; Debugging a program. Case study: Using the Visual C++ debugger. 5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors. 6. Pointer and Array - Stack and Free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing. 7. Stream I/O - Input and output as streams; File I/O using streams.

Teaching/Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks					
	Lectures, supplemented with short quizzes	2,3,4	Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using C/C++ and apply the techniques of developing structured object-oriented applications.					
	Laboratories/tutorials where problems are given to students for them to solve	1,2,3,4	Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finishing the exercises, and interactive Q&A will take place.					
	Assignment, tests and final examination	1,2,3,4,5	By doing assignment, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given C/C++ applications and apply knowledge to solve problems. They will have to design solutions by evaluating different alternatives. To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly. To assure students' understanding of fundamental concepts, a closed-book final examination is arranged.					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended subject learning outcomes to be assessed				
				1	2	3	4	5
	1. In-class exercises		10%	✓	✓	✓	✓	
	2. Short-quizzes		10%		✓	✓	✓	
	3. Programming tests		30%	✓	✓	✓	✓	✓
	4. Assignment		20%	✓	✓	✓	✓	✓
	5. Final examination		30%	✓	✓	✓	✓	✓
	Total		100%					

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The short-quizzes are for assessing the understanding of fundamental concepts. The in-class exercises are conducted to help students familiarized with the programming language and skills. The programming tests are for assessing the ability of students on solving computer problems through programming within a specified period. Through doing assignment, students will be able to experience how to solve computer problems and design solutions by using a systematic approach. The final examination is for assessing the students' ability on using the programming language and analysing computer programs.	
Student Study Effort Expected	Class contact:	
	• Lectures, Tests and Quizzes	26 Hours
	• Laboratory/Tutorial	13 Hours
	Other student study effort:	
	• Self-studying	57 Hours
	• Homework	12 Hours
	Total student study effort:	108 Hours
Reading List and References	Reference Books: 1. S. Rao, <i>Sams Teach Yourself C++ in One Hour a Day</i> , 8 th ed. Indianapolis, IN: Sams, 2017. 2. P. Deitel and H. Deitel, <i>C++ How to Program : Introducing the New C++14 Standard</i> , 10 th ed. Boston, MA: Pearson, 2017. 3. R. Cadenhead and J Liberty, <i>Sams Teach Yourself C++ in 24 hours</i> , 6 th ed. Indianapolis, IN: Sams, 2017.	
Last Updated	July 2018	
Prepared by	Faculty of Engineering	

Subject Description Form

Subject Code	ENG2003
Subject Title	Information Technology
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To provide the foundation knowledge in internet applications, computer networks, and database management that is essential to modern information system design
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the functions and features of modern computing systems. 2. Understand the client-server architecture and be able to set up multiple internet applications. 3. Understand the principles of computer networks and be able to set up simple computer networks. 4. Understand the basic structure of a database system and be able to set up a simple database system. <u>Category B: Attributes for all-roundedness</u> 5. Solve problems using systematic approaches.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to computers</u> Introduction to information technology using Internet of Things as a real life example. Introduction to modern computing systems. 2. <u>Computer Networks</u> Introduction to computer networks (Client-Server Architecture). Study different internet applications (HTTP/FTP/DNS). Explain basic concepts on packet routing (Data Encapsulation/IP Addressing/Functions of Routers). Introduction to basic network security measures. 3. <u>Introduction to data processing and information systems</u> Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Introduction to Information systems. Workflow management. Case study: Database design, implementation and management.
Teaching/Learning Methodology	There will be a mix of lectures, tutorials, and laboratory sessions/workshops to facilitate effective learning. Students will be given case studies to understand and practice the usage of modern information systems.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				
			1	2	3	4	5
	1. Quizzes (in tutorials)	3%	√	√	√		√
	2. Quizzes (in lectures)	14%	√	√	√	√	√
	3. Workshops	14%	√	√	√	√	√
	4. Mid-term Test	11%	√	√	√		√
	5. Assignment	8%				√	√
	6. Examination	50%	√	√	√	√	√
	Total	100 %					
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment methods include an end-of-subject 2-hour written examination (total 50%) and other assessment methods (total 50%), including quizzes, a mid-term test, workshops, and an assignment, which cover intended subject learning outcomes 1, 2, 3, 4, and 5.						
Student Study Effort Expected	Class contact:						
	• Lectures (18), tutorials (6), and workshops (15)					39 Hours	
	Other student study effort:						
	• Workshops preparation (6/workshop)					30 Hours	
	• Self study (3/week)					39 Hours	
	Total student study effort					108 Hours	
Reading List and References	1. B. Williams and S. Sawyer, <i>Using Information Technology: A Practical Introduction to Computers and Communications</i> , 11 th ed., McGraw-Hill, 2014. 2. J. F. Kurose and K. W. Ross, <i>Computer Networking: A Top-Down Approach</i> , 7 th ed., Pearson, 2016. 3. D. E. Comer, <i>Computer Networks and Internets</i> , 6 th ed., Pearson, 2015. 4. B. A. Forouzan, <i>TCP/IP Protocol Suite</i> , 4 th ed., Tmh, 2010. 5. W. Stalling, <i>Data and Computer Communications</i> , 10 th ed., Pearson, 2013. 6. S. Morris and C. Coronel, <i>Database Systems: Design, Implementation, and Management</i> , 11 th Edition, Course Technology, 2014. 7. M. Mannino, <i>Database Design, Application Development, & Administration</i> . 6 th ed., Chicago Business Press, 2014.						
Last Updated	July 2018						
Prepared by	Faculty of Engineering						

Subject Description Form

Subject Code	IC2114
Subject Title	Industrial Centre Training I for EIE
Credit Value	5 training credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objective of this subject is to equip students with knowledge and skills through technical training that are fundamental and essential in 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. Apply engineering drawings for technical communication and produce layout on CAD with application in electrical, electronic and information engineering; 2. Explain legal duties related to occupational safety, identify common workplace health and safety hazards, corresponding control measures and apply personal protection equipment; 3. Apply and create computer program on scientific computing software for technical analysis and modelling; 4. Design electronic circuit on printed wiring board with EDA tool; 5. Fabricate prototype electronic circuit on printed wiring board for experimentation, demonstration and development purposes; 6. Prescribe and use basic electronic instrument to perform parametric test and analysis on simple electronic circuit, troubleshooting, create and apply virtual instrument and identify common electronic product safety tests; 7. Explain pragmatic electronic manufacturing processes, circuit interconnects and assembly methods for electronic product or equipment, specify basic industrial process for mass production and fabricate simple prototype for test and investigation; 8. Design and programme simple embedded systems; 9. Recognize training as an important part for a professional engineering career and the needs for multi-disciplinary training and continual professional development in professional engineering practice.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Engineering Drawing for EIE (18 hours)</u> 1.1. Computer-aided Design (CAD) engineering drawing; basic 2D geometry and functions: point, lines, circle and arc; zoom control; trim fillet and erase; dimensioning, text and label; line type; colour; layer and essential AutoCAD editing functions. 1.2. CAD exercises with AutoCAD: Building plans, use of grid system, floor plan, elevation and section, telecommunication structural cabling, use of symbols and conventions in building services provision. 2. <u>Industrial Safety Overview (15 hours)</u> 2.1. Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures.

	2.2. Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 2.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling. 2.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment. 3. <u>Application of Computing Tool (21 hours)</u> 3.1. 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. Basic 2D and 3D plots. 3.2. M-file programming & debugging; scripts, functions, logic operations, flow control, introduction to graphical user interface. 4. <u>Electronic Circuit Design Practice (18 hours)</u> 4.1. Introduction to electronic design automation (EDA) software; circuit schematics capture and representation; placement of components, capturing, annotation, labeling, net list. Electronic parts library, symbols, decals, physical packages, discrete components, integrated circuits, logic and analogue circuits, electronic parts creation and application. 4.2. Printed Circuit Board (PCB) design, hands on practice on PCB circuit design with EDA tools. 4.3. Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical & electronic device symbols and layout, Circuit artwork, etching process, prototype PCB fabrication. 5. <u>Electronic Measurement with Product Safety Test and Practice (15 hours)</u> 5.1. Application and use of electronic test instruments: current and voltage measurements, two wire and four wire techniques, power supply and signal sources, oscilloscope probes, analogue and digital oscilloscopes. 5.2. Introduction to Virtual Instrument, application and hands-on practice on LabVIEW. 5.3. Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test. 6. <u>Electronic Workshop Practice for EIE (36 hours)</u> 6.1. Introduction to common electronics parts, use of basic test instruments, best practice and basic troubleshooting techniques, electronic workshop safety. 6.2. Introduction to electronic assembly design and manufacturing process, components, tools and machines. 6.3. Introduction to electronic circuit interconnect technologies: Surface Mounted Technology (SMT), Chip-on-board (COB) and wave-soldering. 6.4. Introduction to advanced electronic packaging and assembly process: fine-pitch SMT, Ball Grid Array (BGA), Flip-chip and Chip Scale Package (CSP). 6.5. Soldering and de-soldering techniques, mounting and installation of electronic circuits, wiring of subassemblies.
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	6.6. Hands-on practice on reflow soldering, SMT process, chip level wire bonding, chip-on-board encapsulation, LCD display attachment with heat-seal connector. 6.7. Soldering quality of BGA assembly and X-ray inspection machine. 7. <u>Embedded System Application and Practice (27 hours)</u> 7.1. Introduction to Microchip Microcomputer families and development tools. 7.2. Hands-on practice on memory, I/O, data communications, ADC operations. 7.3. Hands-on practice on LED and LCD displays. 7.4. Hands-on practice on motor control and sensors. 7.5. Application of Microcomputer on consumer electronic products, mechatronics, home automation products, wired and wireless connectivity. Training Schedule: 3 hours per week in Year 1 and Year 2 term time.																																																																											
Teaching/ Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures aim at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials aim at enhancing students' in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.																																																																											
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/ Task</th><th rowspan="2">% Weighting</th><th colspan="9">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></tr><tr><td>Continuous Assessment</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Assignment / Project</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Tests</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Others (Reports & Logbook)</td><td>40%</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="9"></td></tr></table>	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	Continuous Assessment											• Assignment / Project	30%	✓	✓	✓	✓	✓	✓	✓	✓		• Tests	30%	✓	✓	✓	✓	✓	✓	✓	✓		• Others (Reports & Logbook)	40%	✓	✓	✓	✓	✓	✓	✓	✓	✓	Total	100%									
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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): <table border="1" data-bbox="470 808 1415 1104"> <tbody> <tr> <td data-bbox="470 808 1161 882">Lecture/Tutorial</td><td data-bbox="1161 808 1415 882">10 Hours</td></tr> <tr> <td data-bbox="470 882 1161 956">Workshop</td><td data-bbox="1161 882 1415 956">140 Hours</td></tr> <tr> <td data-bbox="470 956 1161 1030">Other student study effort:</td><td data-bbox="1161 956 1415 1030">0 Hour</td></tr> <tr> <td data-bbox="470 1030 1161 1104">Total student study effort:</td><td data-bbox="1161 1030 1415 1104">150 Hours</td></tr> </tbody> </table>	Lecture/Tutorial	10 Hours	Workshop	140 Hours	Other student study effort:	0 Hour	Total student study effort:	150 Hours
Lecture/Tutorial	10 Hours								
Workshop	140 Hours								
Other student study effort:	0 Hour								
Total student study effort:	150 Hours								
Reading List and References	Reference Software List: 1. AutoCAD from Autodesk Inc. 2. MATLAB from The Mathworks Inc. 3. PADS from Mentor Graphics Inc. 4. LabVIEW from National Instrument 5. MPLAB from Microchip Corp. Reference Standards and Handbooks: 1. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams 2. IEC 61082 Preparation of Documents used in Electrotechnology 3. IPC-D-279-1996, Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies, IPC. 4. IPC-J-STD-001F-2014, Requirements for Soldered Electrical and Electronic Assemblies, IPC. 5. IPC-A-610F-2014, Acceptability of Electronic Assemblies, IPC. Reference Books: 1. R.S. Villanucci, A.W. Avtgis, W.F. Megow, <i>Electronic Techniques: Shop Practices and Construction</i>, 7th ed., Practice-Hall, 2002. 2. Training material, manual and articles published by Industrial Centre								
Last Updated	July 2017								
Prepared by	Industrial Centre								

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
Exclusion	AF2618
Objectives	This subject aims to equip students with 1. The fundamental concepts of micro- and macroeconomics related to the engineering industry; 2. The fundamental understanding of finance and costing for engineering operations, budgetary planning and control.
Intended Subject Learning Outcomes	Upon successful completion of this subject, students will be able to: 1. Understand how the relevant economic factors shape the environment within which an engineering company operates; 2. Evaluate the financial condition of a company based on the financial statements; 3. Apply the basic cost accounting techniques in the planning and control of engineering and production activities.
Subject Synopsis/ Indicative Syllabus	<u>Economic Environment of a Firm</u> Microeconomic Factors Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition and monopoly Macroeconomic Factors International trade and globalization <u>Accounting and Engineering Economics</u> Financial statements; Financial ratio analysis; Return on investment; Composition of cost; Cost-volume-profit analysis; Accounting profit versus economic profit <u>Fundamentals of Budgetary Planning and Control</u> Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives
Teaching/ Learning Methodology	The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students' understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
			1	2	3
	Continuous Assessment	50%			
	1. In-class activities	15%	√	√	√
	2. Written assignments	15%	√	√	√
	3. Test	20%	√	√	√
	Final Examination	50%	√	√	√
	Total	100 %			
	To pass this subject, students are required to obtain Grade D or above in both the Continuous Assessment and Examination components.				
Student Study Effort Required	Class contact:				
	• Lecture				26 Hours
	• Tutorial				13 Hours
	Other student study effort:				
	• Study and self-learning				48 Hours
	• Presentation preparation and written assignments				18 Hours
	Total student study effort:				105 Hours
Reading List and References	Recommended Textbooks 1. Parkin and Bade, <i>Foundations of Microeconomics</i>, 8th ed., Pearson, 2018. 2. Sullivan, Wicks and Koelling, <i>Engineering Economy</i>, 16th ed., Pearson, 2014. References 1. Drury, Colin, <i>Management and Cost Accounting</i>, 10th ed., Cengage Learning, 2018. 2. Robert H. Frank, <i>The Economic Naturalist: Why Economics Explain Almost Everything?</i>, Basic Books, 2007.				
Last Updated	July 2018				
Prepared by	School of Accounting and Finance				

Subject Description Form

Subject Code	CBS3241P
Subject Title	Professional Communication in Chinese
Credit Value	2
Level	3
Pre-requisite / Co-requisite	Chinese LCR subjects (in Semester 2 of Year 3 or Semester 1 of Year 4)
Objectives	This subject aims to develop the language competence for professional communication in Chinese required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals and reports.
Intended Subject Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to: 1. Plan, organise and produce professionally acceptable project proposals and reports with appropriate text structures and language for different intended readers 2. Plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences 3. Adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis/ Indicative Syllabus	1. Project proposals and reports in Chinese • Planning and organising project proposals and reports • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the literature to substantiate project proposals • Describing the methods of study • Describing and discussing project results, including anticipated results and results of pilot study • Presenting the budget, schedule and/or method of evaluation • Writing executive summaries/abstracts 2. Oral presentations of projects • Selecting content for audience-focused presentations • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in team presentations • Using effective verbal and non-verbal interactive strategies
Teaching/Learning Methodology	<u>Learning and teaching approach</u> The subject is designed to develop the students' Chinese language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects. The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations.

	The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an engineering-related project to different intended readers/audiences. During the course, students will be involved in: - planning and researching the project - writing project-related documents such as project proposals and reports - giving oral presentations to intended stakeholders of the project					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
				1	2	3
	1. Project proposal in Chinese		60%	✓		✓
	2. Oral presentation of project proposal		40%		✓	✓
	Total		100%			
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessments will arise from the course-long engineering-related project. • Students will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences. • Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.						
Student Study Effort Expected	Class contact:					
	• Seminars					26 Hours
	Other student study effort:					
	• Researching, planning, writing, and preparing the project					44 Hours
	Total student study effort:					70 Hours
Reading List and References	Textbook: 1. 司有和 (1984)：《科技寫作簡明教程》，安徽教育出版社。 2. 葉聖陶、呂叔湘、朱德熙、林燾 (1992)：《文章講評》語文出版社。 3. 于成鯤主編（2003）：《現代應用文》，復旦大學出版社。 4. 岑紹基、謝錫金、祈永華 (2006)：《應用文的語言·語境·語用》，香港教育圖書公司。 5. 邵敬敏主編 (2010)：《現代漢語通論 (第二版)》，上海教育出版社。 6. 于成鯤、陳瑞端、秦扶一、金振邦主編 (2010)：《中國現代應用文寫作規範叢書：科教文與社交文書寫作規範》，復旦大學出版社。					

	7. 香港特別行政區政府教育局·課程發展處中國語文教育組 (2012) : 《常用字字形表》，政府物流服務署印。
Last Updated	July 2016
Prepared by	CBS Department

Subject Description Form

Subject Code	EIE3100
Subject Title	Analogue Circuit Fundamentals
Credit Value	3
Level	3
Pre-requisite	EIE2100 Basic Circuit Analysis EIE2102 Basic Electronics
Co-requisite/ Exclusion	Nil
Objectives	This is the main foundation subject introducing the working principles and constructions of analog electronic circuits. The specific aim is to familiarize students with the design and operation of analog building blocks (e.g., mirrors, differential stages, output stages), practical operational amplifiers, frequency response of transistor amplifiers, feedback amplifiers and oscillators.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the operations of transistor devices, e.g., BJT and MOSFET 2. Analyze the small-signal characteristics of transistor amplifiers 3. Design basic analog building blocks 4. Understand the operations and limitations of operational amplifiers 5. Analyze frequency responses and design feedback circuits and oscillators <u>Category B: Attributes for all-roundedness</u> 6. Communicate effectively 7. Think critically and creatively 8. Assimilate new technological development in related field
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Analog Building Blocks</u> 1.1 Simple current mirrors; problem due to Early effect and non-ideality; Wilson and Widlar mirrors; use of mirrors as active loads. 1.2 Differential amplifier (DA) stage; analysis using half-circuit models, common-mode and differential-mode gains; common-mode rejection ratio (CMRR). 1.3 Output stages; class A, class B and class AB output stages; efficiency; harmonic distortions. 2. <u>Operation Amplifier Design</u> 2.1 Typical operational amplifier circuit: input differential stage, CE gain stage, and output stage; details of internal circuit design: active loading, level shift, current sourcing. 2.2 Non-idealities: dc offset, input bias current (causing offset); finite input impedance, etc. 2.3 Slew-rate limitation; gain-bandwidth product; stability design; concept of unity-gain feedback; phase margin; design of low-frequency pole and use of Miller effect for internal compensation. 3. <u>Frequency Responses of Transistor Amplifiers</u> 3.1 Parasitic junction capacitances and their effects on the current gain of transistors. 3.2 Complete high-frequency model of single-stage common-emitter amplifiers. 3.3 Derivation of first roll-off frequency (dominant pole) due to Miller effect.

	4 <u>Feedback Circuits and Oscillators</u> 4.1 General feedback configuration; basic amplifier gain, loop gain and closed-loop (overall) gain. 4.2 Effects of feedback on gain, frequency response, distortion, input and output impedances. 4.3 Feedback circuit configurations: shunt-series, shunt-shunt, series-shunt and series-series feedback; stability analysis; phase margins and compensation methods; analysis of feedback circuits via two-port models. 4.4 Oscillation criteria; amplitude limiting and sustained oscillation; Colpitts, Hartley, Wien bridge, phase-shift and crystal oscillators. Laboratory Experiments: Each student is required to complete the following three laboratory experiments: 1. Title: Negative Feedback Amplifier Objective: To design the feedback network for a given amplifier in order to meet certain specifications. 2. Title: Oscillator Objective: To design a Wien-bridge oscillator using an IC amplifier. 3. Title: Characteristics of Operational Amplifier Objective: To study the internal operation of an operation amplifier and measure the characteristics of the responses.												
Teaching/ Learning Methodology	<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 students</td></tr><tr><td>Tutorials</td><td>2, 3, 4, 5, 7, 8</td><td>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</td></tr><tr><td>Laboratory sessions</td><td>3, 4, 5, 6, 7</td><td>Students in groups of 2-3 will conduct practical measurement and evaluate the performance of electronic circuits</td></tr></table>	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks	Lectures	1, 2, 3, 4, 5	Fundamental principles and key concepts of the subject are delivered to students	Tutorials	2, 3, 4, 5, 7, 8	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	3, 4, 5, 6, 7	Students in groups of 2-3 will conduct practical measurement and evaluate the performance of electronic circuits
Teaching and Learning Method	Intended Subject Learning Outcome	Remarks											
Lectures	1, 2, 3, 4, 5	Fundamental principles and key concepts of the subject are delivered to students											
Tutorials	2, 3, 4, 5, 7, 8	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	3, 4, 5, 6, 7	Students in groups of 2-3 will conduct practical measurement and evaluate the performance of electronic circuits											

Assessment Methods in Alignment with 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	
	1. Continuous Assessment (total 40%)										
	• Assignments	15%	✓	✓	✓	✓	✓				
	• Laboratory sessions	15%				✓	✓	✓	✓	✓	
	• Test	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									
Assignments	Analytical and design problems are used to evaluate students' ability in applying concepts and skills learnt in the classroom.										
Test and examination	Mid-semester test is used to measure the students' ability to remember facts and figures as well as their comprehension of subject materials; Final exam is used to evaluate students' ability to think critically and creatively in order to come up with an effective solution for an existing problem.										
Laboratory sessions	Each group of students is required to produce a written report; Accuracy and the presentation of the report will be assessed; Assessment of the reports will focus on both technical knowledge and ability to communicate effectively.										
Student Study Effort Expected	Class contact (time-tabled):										
	• Lecture								24 Hours		
	• Tutorial/Laboratory/Practice Classes								15 hours		
	Other student study effort:										
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination								36 Hours		
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing								30 Hours		
	Total student study effort:								105 Hours		

Reading List and References	Textbooks: 1. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, <i>Analysis and Design of Analog Integrated Circuits</i>, New York: Wiley, 2001. 2. W.M.C. Sansen, <i>Analog Design Essentials</i>, New York: Springer, 2006. Reference Books: 1. S. Sedra and K.C. Smith, <i>Microelectronic Circuits</i>, Oxford University Press, 2007. 2. D.A. Jones and K. Martin, <i>Analog Integrated Circuit Design</i>, New York: Wiley, 1997. 3. D.A. Neamen, <i>Electronic Circuit Analysis and Design</i>, 2nd ed., New York: McGraw-Hill, 2001. 4. R.W. Goody, <i>PSPICE for Windows - A Circuit Simulation Primer</i>, Englewood Cliffs: Prentice-Hall 1995.
Last Updated	June 2015
Prepared by	Prof. Michael Tse

Subject Description Form

Subject Code	EIE3105
Subject Title	Integrated Project
Credit Value	6
Level	3
Pre-requisites	EIE2211 Logic Design ENG2002 Computer Programming
Co-requisite/ Exclusion	Nil
Objectives	Provide students with the concepts and techniques in designing embedded software and hardware interfaces. Covering different topics of preceding core subjects, this subject emphasizes the application of knowledge in an integrated manner. Apart from various technical challenges, students will also need to address typical non-technical issues involved in conducting a project or product development.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand technical knowledge specific to autonomous robots. 2. Integrate and apply knowledge acquired in previous subjects. 3. Design under cost constraints and with component limitations/tolerances in mind. 4. Locate and resolve practical problems on project development. <u>Category B: Attributes for all-roundedness</u> 5. Search, self-learn and try untaught solutions. 6. Exercise discipline and time-planning to meet deadlines. 7. Present ideas and findings effectively. 8. Work with others in a team collaboratively and exercise leadership.
Subject Synopsis/ Indicative Syllabus	1. <u>Embedded System Hardware</u> Details of a typical microcontroller architecture 2. <u>Microcontroller</u> Internal resources; Electrical characteristics of I/O pins; Timer/counter operations and interrupts; Pulse control using timer/counter; Pulse measurement using timer/counter. 3. <u>I/O Interfacing</u> Output-pin driving limitations; Inductive load driving; Keyboard multiplexing; Display multiplexing; LCD controllers; Switches, relays and power-control semiconductors; Sensors; Actuators; A/D and D/A converters; Serial interfaces; I/O expansion techniques; Grounding issues and dc isolation. 4. <u>Embedded Software Development and Testing</u> Embedded software issues; Tasks and events; Interrupt system: nesting, priority and latencies; C-language Programming. 5. <u>Platform-Specific Anatomy of a Small Autonomous Robot</u> Mechanical structures; Circuit design; Interrupts and tasks; Generic software functions and high-level algorithms; Concurrency and timing issues; Modern control technologies. 6. <u>Introduction to Digital Control Systems</u> Poles/zeros and system response, basics of PID control, the root locus method, Ziegler-Nichols rules for tuning PID controllers, sampled-data systems, z-transform and discrete transfer function, stability analysis,

	steady-state errors and transient response of digital systems, design and implementation of digital controllers. 7. <u>Project Management</u> Time and progress management; Communication. Laboratory Experiments: 1. Introduction to Microcontroller Programming 2. Timer/Counter Programming 3. Interrupt Programming 4. Serial Port Programming 5. Interfacing Project: 1. Hardware: Construction of a small autonomous robot 2. Software: Writing program to control the small autonomous robot in order to finish a number of tasks. 3. Presentation and report writing		
Teaching/Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
	Lectures	1, 2	In lectures, students are introduced to the knowledge of the relevant fields. Students will be able to define and describe key terms and concepts. They will also be able to explain and generalize knowledge about embedded systems.
	Laboratories	1, 2, 3, 4, 5	By performing hands-on practical experiments, students will be able to apply the acquired knowledge to designing solutions to embedded system problems. They will relate their observation to theories and principles. They will also evaluate performance of their design.
	Quizzes	1, 2, 3	Students will develop a firm understanding and comprehension of the knowledge taught.
	Final Tests	1, 2, 3	Students will develop a firm understanding and comprehension of the knowledge taught.
	Project	1 - 8	It is an engineering development with objectively defined milestones during its progress. The scope to be covered shall include mechanical work, embedded software development and circuit design. It shall provide ample space for the more enthusiastic students to excel. Each student will have chances to play the role of leading the group in accomplishing subtasks assigned. Progress will be measured by functional demonstrations, logbooks and reports.

Assessment Methods in Alignment with 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									
	1. Exercises	14%	✓	✓	✓					
	2. Quizzes	12%	✓	✓	✓					
	3. Practical Test	15%	✓	✓	✓					
	4. Tests	10%	✓	✓	✓					
	5. Project logbook	4%	✓	✓	✓	✓	✓	✓	✓	✓
	6. Project report and presentation	10%	✓	✓	✓	✓	✓	✓	✓	✓
	7. Project demonstration	35%	✓	✓	✓	✓	✓	✓		✓
	Total	100%								
Student Study Effort Expected	Class contact (time-tabled):									
	• Lecture								38 Hours	
	• Tutorial/Laboratory/Practical Classes								42 Hours	
	• Tests/Quizzes								10 Hours	
	Other student study effort:									
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination								38 Hours	
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and logbook/report writing								42 Hours	
	• Project Development: preview of materials, revision, self-evaluation and testing of robots								30 Hours	
	Total student study effort:								200 Hours	
Reading List and References	1. <i>The AVR Microcontroller and Embedded Systems: Using Assembly and C</i> , M. A. Mazidi, S. Naimi, and S. Naimi, Pearson, 2014. 2. D. Lock, <i>Project Management</i> , 10 th ed., Farnham: Gower, 2013.									
Last Updated	May 2018									
Prepared by	Dr Lawrence Cheung / Dr KH Loo									

Subject Description Form

Subject Code	EIE3109
Subject Title	Mobile Systems and Application Development
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This course aims at providing students with an understanding of the real-time embedded and mobile systems, and the techniques essential to the design and implementation of mobile applications.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the structure of real-time operating systems for modern mobile computer systems. 2. Understand the programming techniques and tools for developing software that is run in modern mobile computer systems 3. Apply the knowledge to develop practical applications for modern real-time mobile computer systems. <u>Category B: Attributes for all-roundedness</u> 4. understand the creative process when designing solutions to a problem
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> Introduction to Embedded Systems – embedded real-time systems, embedded programming and program models, real-time operating system (RTOS). Introduction to Mobile Systems and Mobile Application Development – advancement of mobile devices, comparison of various mobile platforms (iOS, Android, Windows Phone, Blackberry, etc.), application design process. 2. <u>iOS Application Development</u> Introduction to iOS – system architecture, development environment (Xcode), MVC architecture. Introduction to Objective-C Programming – message passing, delegate pattern, retain/release. 3. <u>Android Application Development</u> Introduction to Android OS – development environment (Eclipse), Android application basic (activity, service, content provider, broadcast receiver, intent resolution). User Interface – layout overview, user interface widget, user interface event handling, user notification. Data Storage – shared preference, internal storage, external storage, SQLite, content provider. Networking – Android network overview and management, socket and HTTP, Wi-Fi and Bluetooth, GPS & telephony. Multimedia – voice recording, image capturing, basic drawing & animation.

Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures. Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate performance of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class. While lectures and tutorials will help to achieve the professional outcomes, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.																																																			
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table><thead><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></thead><tbody><tr><td>1. Continuous Assessment (total: 50%)</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Homework and assignments</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>• Tests</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Laboratory exercises</td><td>30%</td><td></td><td></td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></tbody></table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assignment, homework and laboratory exercises will require students to apply what they have learnt to solve problems. There will be open-ended questions that allow students to exercise their creativity in making design. Examination and tests: They assess students' achievement of the learning outcomes more rigorously.						Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Continuous Assessment (total: 50%)						• Homework and assignments	10%	✓	✓	✓	✓	• Tests	10%	✓	✓	✓		• Laboratory exercises	30%			✓	✓	2. Examination	50%	✓	✓	✓	✓	Total	100%				
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Total	100%																																																			
Student Study Effort Expected	<table><tr><td>Class contact (time-tabled):</td><td></td></tr><tr><td>• Lecture</td><td>24 Hours</td></tr><tr><td>• Tutorial/Laboratory/Practice Classes</td><td>15 hours</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination</td><td>36 Hours</td></tr><tr><td>• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing</td><td>30 Hours</td></tr><tr><td>Total student study effort:</td><td>105 Hours</td></tr></table>					Class contact (time-tabled):		• Lecture	24 Hours	• Tutorial/Laboratory/Practice Classes	15 hours	Other student study effort:		• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours	Total student study effort:	105 Hours																																	
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Reading List and References	Reference Books: 1. Raj Kamai, <i>Embedded Systems: Architecture, Programming and Design</i>, 2nd ed., McGraw-Hill, 2009. 2. Jack Nutting, Fredrik Olsson, David Mark and Jeff LaMarche, <i>Beginning iOS 7 Development: Exploring the iOS SDK</i>, Apress, 2014. 3. Grant Allen, <i>Beginning Android 4</i>, Apress, 2012.
Last Updated	June 2015
Prepared by	Dr Ivan Ho

Subject Description Form

Subject Code	EIE3112
Subject Title	Database System
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To introduce: 1. database design, development, and programming 2. advanced database queries and database security 3. data warehousing and data mining
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Database design, development, and programming 2. Advanced database queries and database security. 3. Data warehousing and data mining <u>Category B: Attributes for all-roundedness</u> 4. Communicate effectively
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Database Design and Development</u> 1.1 DBMS systems; Client-server architecture; Database architectures and the web 1.2 SQL: data manipulation; data definition; 1.3 DB Development: DB applications and views; 1.4 Advanced SQL: SQL programming language; stored procedures; functions; triggers; cursors; exception handling 1.5 ER Modelling: ER diagrams; Transforming ER diagrams to relations 1.6 Normalization: Data redundancy and update anomalies; functional dependencies; normalization processes; normal forms 2. <u>Managing Database Environments</u> 2.1 Database Security: Database security best practices; SQL injection; Preventing SQL injection 3. <u>Data Warehouse and Data Mining</u> 3.1 Architectures of data warehouse; applications of data warehouse; data warehouse tools and technologies 3.2 Data warehouse queries; OLTP versus OLAP; 3.3 Data-mining processes; Data representation; 3.4 Classification, regression, and cluster Analysis Laboratory Experiments Lab 1: Database Implementation and SQL Lab 2: Advanced SQL Lab 3: Data Mining and Data Analysis

Teaching/Learning Methodology	Lectures: Fundamental principles and key concepts of the subject are delivered to students. Tutorials: 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. Students will be given programming exercises and use database development tools to design database. Laboratory Sessions: Students will do some programming exercises to enhance their understanding on database design and development.					
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 (Total: 50%)					
	• Short quizzes	5%	✓	✓		
	• Assignment	5%	✓	✓	✓	✓
	• Test	20%	✓	✓		
	• Laboratory	20%	✓	✓	✓	✓
	2. Examination	50%	✓	✓	✓	
	Total	100%				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Short quizzes: These can measure the students’ understanding of the theories and concepts as well as their comprehension of subject materials. Test & Examination: End-of-chapter-type problems are used to evaluate the students’ ability in applying concepts and skills learnt in the classroom; students need to think critically and to learn independently in order to come up with an appropriate design. Laboratory: Each student is required to produce a report; the accuracy and presentation of the report will be assessed.					
Student Study Effort Expected	Class contact (time-tabled):					
	• Lecture/Tutorial		30 Hours			
	• Laboratory/Practice Classes		9 Hours			
	Other student study effort:					
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination		36 Hours			
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing		30 Hours			
	Total student study effort:		105 Hours			

Reading List and References	1. Thomas Connolly and Carolyn Begg, <i>Database Systems: A Practical Approach to Design, Implementation, and Management</i>, 6/E, Pearson, 2015. 2. Mark L. Gillenson, <i>Fundamentals of database management systems</i>, Wiley, 2nd ed., Wiley, 2012. 3. I.H. Witten, <i>Data Mining: Practical Machine Learning Tools and Techniques</i>, 3rd ed., Morgan Kaufmann, 2011
Last Updated	September 2016
Prepared by	Dr Pauli Lai

Subject Description Form

Subject Code	EIE3305
Subject Title	Integrated Analogue and Digital Circuits
Credit Value	3
Level	3
Pre-requisite	EIE2100 Basic Circuit Analysis EIE2102 Basic Electronics EIE3100 Analogue Circuit Fundamentals
Co-requisite/ Exclusion	Nil
Objectives	To develop an in-depth understanding of the design principles and applications of integrated analogue and digital circuits.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. An understanding of the fundamental principles and applications of digital logic circuits. 2. An ability to design periodic signal generators from digital logic circuits. 3. An understanding of filter design principles and circuit technologies. 4. An ability to apply theory and realize analog filter circuits. 5. An understanding of output stage design of analog circuits. 6. An overview of advanced logic circuit families. <u>Category B: Attributes for all-roundedness</u> 7. An ability to communicate effectively 8. An ability to think critically and creatively 9. An ability to assimilate new technological development in related field
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Integrated Analog Circuits</u> 1.1 <i>Analog filters</i>: Filter type and specifications, transfer function, Butterworth and Chebyshev filters, first-order and second-order filter functions, passive second-order LCR filters, active second-order filters based on inductor replacement / two-integrator-loop / single-amplifier biquad, switched-capacitor filters 1.2 <i>Waveform generators</i>: Basic principles of sinusoidal oscillators, oscillator feedback loop and oscillation criteria, op-amp-RC oscillator circuits (Wien-Bridge oscillator, phase-shift oscillator, quadrature oscillator), LC and crystal oscillators, bistable multivibrators, monostable multivibrators, 555 integrator circuit timer 1.3 <i>Output stage design</i>: Classification of output stages, Class A / B / AB output stages, biasing circuit design, transfer characteristic, signal waveform, power dissipation and conversion efficiency, harmonic distortion 2. <u>Integrated Digital Circuits</u> 2.1 <i>CMOS logic</i>: Basic logic inverter, voltage transfer characteristic, noise margins, propagation delay, inverter sizing, power dissipation, pull-up and pull-down networks, synthesis method for CMOS logic-gate circuits, transistor sizing, fan-in and fan-out 2.2 <i>Advanced logic circuit families – an overview</i>: Pseudo-NMOS logic, pass-transistor logic, dynamic MOS logic, emitter-coupled logic (ECL), bipolar CMOS (BiCMOS) logic 2.3 <i>Memory circuits</i>: Flip-flop (basic principles and applications), memory-chip organization, random-access memory (RAM) – static

	and dynamic RAM, sense amplifiers, address decoders, read-only memory (ROM) – programmable ROM (PROM), erasable PROM (EPROM), electrically EPROM (EEPROM) Laboratory Experiments: 1. Design of Butterworth / Chebyshev filter. 2. Sinusoidal, square-wave, and triangular waveform generators. 3. Characterization of basic CMOS logic inverter.		
Teaching/ Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
	Lectures	1, 2, 3, 4, 5, 6	Fundamental principles and key concepts of the subject are delivered to students
	Tutorials	1, 2, 3, 4, 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
	Laboratory sessions	1, 2, 3, 4, 7, 8, 9	Students in groups of 2-3 will conduct practical measurement and evaluate the performance of electronic circuits

Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="9">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></tr><tr><td>1. Continuous Assessment (40%)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Assignment</td><td>13%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>• Tests</td><td>13%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>• Laboratory sessions</td><td>14%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="9"></td></tr></table>	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 (40%)										• Assignment	13%	✓	✓	✓	✓	✓	✓			• Tests	13%	✓	✓	✓	✓	✓	✓			• Laboratory sessions	14%	✓	✓	✓	✓			✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	✓	✓	✓	✓	✓	Total	100%									
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Reading List and References	Textbooks: 1. Adel S. Sedra and Kenneth C. Smith, <i>Microelectronic Circuits</i>, 6th ed., Oxford University Press, 2011. 2. Jacob Millman and Arvin Grabel, <i>Microelectronics</i>, 2nd ed., McGraw-Hill, 1987. Reference Books: 1. Thomas L. Floyd, <i>Digital Fundamentals</i>, 10th ed., Pearson, 2009. 2. Rolf Schaumann and Mac E. Van Valkenburg, <i>Design of Analog Filters</i>, Oxford University Press, 2001. 3. John P. Hayes, <i>Introduction to Digital Logic Design</i>, Addison-Wesley, 1993. 4. Paul Horowitz and Winfield Hill, <i>The Art of Electronics</i>, 2nd ed, Cambridge University Press, 1989.
Last Updated	May 2018
Prepared by	Dr S. C. Wong

Subject Description Form

Subject Code	EIE3311
Subject Title	Computer System Fundamentals
Credit Value	3
Level	3
Pre-requisite	<u>For 42470:</u> EIE2211 Logic Design <u>For 42375:</u> EIE2261 Logic Design
Co-requisite/ Exclusion	Nil
Objectives	To provide a broad treatment of the fundamentals of computer systems.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Apply knowledge of mathematics, science, and engineering appropriate to a basic computer system. 2. Use computer tools with an understanding of the processes and limitations. 3. Understand the fundamentals of computer systems and associated technologies. <u>Category B: Attributes for all-roundedness</u> 4. Communicate effectively.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Microprocessors and Microcomputers</u> The following topics will be discussed in detail with references to one or two well-established (contemporary) microprocessor systems. 1.1 CPU architecture: instruction fetch and execution, pipelining, instruction types, examples of assembly language programs, processor control units and micro-programmed control unit, real mode and protected mode of x86 processors, advanced processors, Graphics Processing Units (GPUs) and general-purpose computing. 1.2 Memory interface and memory management: memory devices, address decoding, memory interface, banking, bus buffering and driving, bus cycle and wait state, memory segmentation and paging. 1.3 Basic I/O interface: memory-mapped I/O, I/O port address decoding, programmable peripheral interface, handshaking. 1.4 Interrupts: polling, programmed I/O, interrupt I/O; basic interrupt processing, software interrupt, expanding the interrupt structure. 1.5 Direct Memory Access and DMA-controlled I/O: basic DMA operation, DMA controller, shared-bus operation. 1.6 Cache memory: mapping, associativity, replacement policies, write policies, performance. 1.7 Computer buses: evolution of bus architectures, PCI (PCIe) local bus, USB bus 2. <u>Introduction to Operating System</u> 2.1 File systems: secondary memory, disk formatting, file allocation table, file management, directory entry and file control block. 2.2 Multitasking and time-sharing: time-slicing, process states and process control block, context-switching mechanism, scheduling schemes and process priorities.

	2.3 Boot-up ROM, firmware, hardware, device drivers. 2.4 Extension of OS and computing system to cloud Computing. 3. <u>Computer Arithmetic</u> 3.1 Data formats: signed/unsigned numbers, binary/decimal/BCD numbers, ASCII, fixed/floating point numbers, IEEE standard. 3.2 Arithmetic algorithms: fast addition, multiplication and division algorithms. Laboratory Experiment: 1. x86 registers and memory architecture 2. x86 assembly language programming 3. Cache memory 4. I/O interface and Interrupt I/O		
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 and Assignments	1, 2, 3, 4	supplementary to lectures and are conducted with a 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 Students take home more questions after each tutorial session and hand in their answers in the subsequent tutorial session
	Laboratory sessions	1, 2, 3, 4	students will make use of a x86 assembler and debugger to develop an assembly program; software to simulate various OS management techniques and evaluate their performance; and circuit board to study various interfacing techniques and evaluate their efficiency and performance

Assessment Methods in Alignment with Intended Subject Learning Outcomes	Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
			1	2	3	4
	1. Continuous Assessment (Total: 40%)					
	• Assignments	10%	✓	✓	✓	✓
	• Laboratory sessions	10%	✓	✓	✓	✓
	• Test	20%	✓		✓	✓
	2. Examination	60%	✓		✓	✓
	Total	100%				
	The continuous assessment consists of short quizzes, assignments, laboratory reports and tests.					
	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;					
Laboratory sessions	each student is required to produce a written report; accuracy and the presentation of the report will be assessed;					
Student Study Effort Expected	Class contact (time-tabled):					
	• Lecture		24 Hours			
	• Tutorial/Laboratory		15 hours			
	Other student study effort:					
	• Lecture/Tutorial: preview/review of notes; assignments; preparation for test/examination		54 Hours			
	• Laboratory: preview of materials, revision and/or reports writing		12 Hours			
	Total student study effort:		105 Hours			

Reading List and References	Reference Books: 1. 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. 2. C. Hamacher, Z. Vranesic, S. Zaky, and N. Manjikian, Computer Organization and Embedded Systems, 6th ed., McGraw-Hill, 2012. 3. W. Stallings, Computer Organization & Architecture: Designing for Performance, 10th ed., Prentice Hall, 2016. 4. Muhammad A. Mazidi and Janice G. Mazidi, The 80x86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing, International Edition, 5th ed., Pearson Education, 2010. 5. J. Uffenbeck, The 80x86 Family: Design, Programming, and Interfacing, 3rd ed., Prentice Hall, 2002. 6. T. Erl, Z Mahmood, and R. Puttini, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
Last Updated	February 2018
Prepared by	Dr Zheru Chi

Subject Description Form

Subject Code	EIE3312
Subject Title	Linear Systems
Credit Value	3
Level	3
Pre-requisite	AMA2111 Mathematics I
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: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the representations and classifications of the signals and systems. 2. Understand the modelling of linear systems. 3. Use different techniques to analyze and design systems. 4. Apply software tools to laboratory exercises for experimenting with theories, and to the analysis and design of signals and systems. 5. Appreciate the advantages and disadvantages of using the different representations and modeling approaches. <u>Category B: Attributes for all-roundedness</u> 6. Present ideas and findings effectively. 7. Think critically and learn independently. 8. Work in a team and collaborate effectively with others.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Signal Representation</u> Signal Classification, Continuous and Discrete-Time Signals, Random Signals. Time-Domain and Frequency-Domain Representations. 2. <u>Continuous-Time and Discrete-Time Systems</u> 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. <u>Fourier Representations for Signals</u> 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, 4. <u>Laplace Transform</u> 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. <u>Analogue Filters</u> 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																																																																														
Teaching/ Learning Methodology	<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, 5, 7</td><td>Fundamental principles and key concepts of the subject are delivered to students.</td></tr><tr><td>Tutorials</td><td>1, 2, 3, 5, 7</td><td>These are supplementary to lectures and are conducted with smaller class sizes; students will be able to clarify concepts and to gain a deeper understanding of the lecture material; problems and application examples are given and discussed.</td></tr><tr><td>Laboratory sessions</td><td>4, 6, 7, 8</td><td>Students will make use of the software MATLAB to simulate the various theories and visualize the results.</td></tr></table>	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks	Lectures	1, 2, 3, 5, 7	Fundamental principles and key concepts of the subject are delivered to students.	Tutorials	1, 2, 3, 5, 7	These are supplementary to lectures and are conducted with smaller class sizes; students will be able to clarify concepts and to gain a deeper understanding of the lecture material; problems and application examples are given and discussed.	Laboratory sessions	4, 6, 7, 8	Students will make use of the software MATLAB to simulate the various theories and visualize the results.																																																																		
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	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/Tasks	Remark
	Short quizzes	These can measure the students' understanding of the theories and concepts as well as their comprehension of subject materials.
	Assignments, tests and examination	End-of-chapter-type problems are used to evaluate the students' ability in applying concepts and skills learnt in the classroom; students need to think critically and to learn independently in order to come up with an alternative solution to an existing problem.
	Laboratory sessions	Each student is required to produce a written report; the accuracy and presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each student to evaluate his/her technical knowledge and communication skills.
Student Study Effort Required	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. Ed. Kamen and Bonnie Heck, <i>Fundamentals of Signals and Systems Using the Web and Matlab</i>, 3/e, Prentice-Hall, 2007. 2. M.J. Roberts, <i>Fundamentals of Signals & Systems</i>, McGraw-Hill, 2008 3. Simon Haykin and Barry Van Veen, <i>Signals and Systems</i>, Wiley, 2003. 4. Charles L. Phillips, et al., <i>Signals, Systems, and Transforms</i>, 3/e, Prentice-Hall, 2003.	
Last Updated	May 2018	
Prepared by	Prof. Kenneth Lam	

Subject Description Form

Subject Code	EIE3320
Subject Title	Object-Oriented Design and Programming
Credit Value	3
Level	3
Pre-requisite	<u>For 42470 and 42477:</u> ENG2002 Computer Programming <u>For 42375:</u> EIE2264 Computer Programming
Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with the principles of object-oriented software design and programming 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: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the principles of object oriented design. 2. Apply Java in object oriented software development. 3. Apply UML in object oriented software modeling. 4. Apply object oriented approach to developing computer software. <u>Category B: Attributes for all-roundedness</u> 5. Learn independently and be able to search for the information required in solving problems. 6. Present ideas and findings effectively. 7. Think critically. 8. Work in a team and collaborate effectively with others.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to Software Engineering</u> Software products; software processes; software process models; 2. <u>Java Programming Basic</u> Java technologies; Java platform; Java language basic: variables, operators, expressions, statements, blocks, control flow, methods, arrays. 3. <u>Object-Oriented Programming with Java</u> 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. <u>Web Programming with Java</u> <i>JavaScript</i>: Client-side Web programming; JavaScript and HTML; Object, events, and event handlers in JavaScript. <i>Java Servlets</i>: architecture of servlets, client interaction, life cycle of servlets, saving client states; servlet communications, session tracking, and using server resources. 5. <u>Unified Modelling Language (UML)</u> 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. Architectural modelling: components, deployment, and collaborations. Mapping UML diagrams to Java Code. Laboratory Experiment: 1. <u>Laboratory Work</u> Students will implement an on-line shopping system using Java Servlets and Tomcat Web server. 2. <u>Practical Work</u> Students will be requested to use integrated development environment (IDE) 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	fundamental principles and key concepts of the subject are delivered to students
	MC Quizzes	1, 2, 3	students' knowledge on/understanding of certain topics can be easily estimated, and the corresponding teaching time will be adjusted accordingly
	Tutorials	1,2,4,5,6	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts through developing simple Java programs.
	Laboratory sessions	4,5,7	Students will need to design, develop, test, and document Java programs.
	Mini-project	3,4,5,7,8	Students in groups of 2-3 are required to build a 3-tier online shopping software. They will also need to use UML to document their software.

Assessment Methods in Alignment with 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
	1. Continuous Assessment (Total: 50%)									
	• Assignments	8%		✓	✓	✓	✓		✓	
	• Laboratory sessions	10%		✓		✓		✓	✓	✓
	• Test	32%	✓							
	2. Examination	50%	✓							
	Total	100%								
	The continuous assessment consists of a number of short quizzes, programming assignments, a mini-project, laboratory reports and a mid-term test.									
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:										
Specific Assessment Methods/Tasks	Remark									
Short quizzes	Multiple choices and true/false questions will be used to test and enhance students' understanding about the topics covered in lectures.									
Assignments	Students will be asked to write Java programs and test the programs. They will also need to use UML diagram to illustrate the structure of their programs. Students will need to think critically and creatively in order to come up with a good solution for an existing problem.									
Laboratory sessions and mini-project	Each group of students are required to produce a written report. Students will be accessed based on (1) the quality of their programs and (2) the clarity of their reports. Students will be asked to work as a team to develop a web application. Each of them will be responsible for part of the software.									
Test and Exam	End-of-chapter problems will be used to evaluate students' ability in applying concepts and skills learnt in the classroom									

Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbooks: 1. G. Booch, I. Jacobson and J. Rumbaugh, <i>The Unified Modeling Language User Guide</i>, 2nd ed., Addison-Wesley, 2005. 2. D.J. Barnes and M. Kolling, <i>Objects First with Java: A Practical Introduction using BlueJ</i>, 5th ed., Prentice-Hall, 2012. Reference Books: 1. H.M. Deitel and P.J. Deitel, <i>Java: How To Program (Early Objects)</i>, 10th ed., Prentice-Hall, 2014. 2. J. Lewis and W. Loftus, <i>Java Software Solutions</i>, 8th Edition, Pearson, 2015. 3. J. Rumbaugh, I. Jacobson and G. Booch, <i>The Unified Modeling Language Reference Manual</i>, 2nd ed., Addison-Wesley, 2004.	
Last Updated	February 2018	
Prepared by	Dr Lawrence Cheung	

Subject Description Form

Subject Code	EIE3331
Subject Title	Communication Fundamentals
Credit Value	3
Level	3
Pre-requisite	AMA2111 Mathematics I
Co-requisite/ Exclusion	Nil
Objectives	Telecommunication plays an important role in modern societies that rely heavily on a knowledge economy. 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: <u>Category A: Professional/academic knowledge and skills</u> 1. Identify various elements, processes, and parameters in telecommunication systems, and describe their functions, effects, and interrelationship. 2. Analyze, measure, and evaluate the performance of a telecommunication system against given criteria. 3. Design typical telecommunication systems that consist of basic and essential building blocks. <u>Category B: Attributes for all-roundedness</u> 4. Communicate effectively. 5. Think critically and creatively. 6. Assimilate new technological development in related field.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction (1 hour)</u> 1.1 Introduction to telecommunication systems, their past and present development; elements of a basic communication system; examples of practical telecommunication systems. 2. <u>Analog Communications (10 hours)</u> 2.1 Amplitude Modulation (AM): double sideband, double sideband with suppressed carrier, single sideband, frequency spectrum and power of the AM signal, Frequency Division Multiplexing. 2.2 Demodulation of AM signals: coherent detector, direct demodulation 2.3 Frequency modulation: bandwidth of FM signals, Stereo FM. 2.4 Demodulation of FM signals: Phase-Locked Loop (PLL) detector. 2.5 Comparison of AM and FM performance: bandwidth, signal-to-noise ratio 3. <u>Analog to Digital Conversion (4 hours)</u> 3.1 Sampling theorem; pulse amplitude modulation 3.2 Quantizing: uniform quantization and quantization noise, SNR (e.g.: Audio CD standard), non-uniform quantization (e.g. A-law, u-law) 3.3 Pulse code modulation (PCM) 3.4 Time division multiplexing: T1 multiplexing system 4. <u>Digital Modulation and Demodulation (9 hours)</u>

	4.1 ASK, FSK, PSK, DPSK, QPSK (e.g. satellite system), OQPSK, QAM (e.g. Microwave link applications), constellation diagram, bandwidth. 4.2 Coherent demodulation 4.3 Non-coherent demodulation (e.g. DPSK, OQPSK) 4.4 BER performance over Additive White Gaussian Noise (AWGN) channel 4.5 Effects of bandwidth, distortion, noise, timing error on detection, eye diagram Practical: Analog communication experiments (6 hours) Matlab simulation/experiments in digital communication systems (6 hours) Assignment: Reception survey of analog sound broadcast quality in Hong Kong																	
Teaching/ Learning Methodology	<table><tr><th>Teaching and Learning Method</th><th>Intended Subject Learning Outcome</th><th>Remarks</th></tr><tr><td>Lectures, supplemented with interactive questions and answers, and short quizzes</td><td>1,2,3,5,6</td><td>In lectures, students are introduced to the <i>knowledge</i> of the telecommunication field; <i>comprehension</i> of the knowledge is strengthened with interactive Q&A and short quizzes. The students will be able to <i>define</i> and <i>describe</i> key terms and concepts about telecommunication. They will also be able to <i>explain</i> and <i>generalize</i> knowledge about telecommunication (e.g. different modulation techniques and their performance, difference between analog and digital modulation techniques)</td></tr><tr><td>Tutorials where case studies are conducted, and problems are given to students for them to solve</td><td>1,2,3,4,5,6</td><td>In tutorials, students <i>apply</i> what they have learnt in analyzing cases (e.g. superheterodyne receiver structure) and solving problems (e.g. calculating the channel capacity of a given channel). They will <i>analyze</i> the given information, <i>compare</i> and <i>contrast</i> different scenarios and propose solutions or alternatives.</td></tr><tr><td>Laboratories, where students will conduct experiments on digital communication systems</td><td>2,3,4,5,6</td><td>By performing hands-on authentic tasks, the students will be able to <i>synthesize</i> a structure of knowledge by <i>designing</i> a solution to a communication problem. They will <i>relate</i> the observation to theories and principles. They will also <i>evaluate</i> outcomes of the tasks they perform and <i>interpret</i> the data they gather.</td></tr><tr><td>Assignment/ homework, online quizzes, tests, end-of-chapter problems</td><td>1,2,3,4,5,6</td><td>Through working assignment and homework, online quizzes, and end-of-chapter problems in text books, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught. They will <i>analyze</i> given information and <i>apply</i> knowledge in solving problems. For some design type of questions (e.g. design a communication link with a given S/N ratio), they will have to <i>synthesize</i> solutions by <i>evaluating</i> different alternatives.</td></tr></table>	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks	Lectures, supplemented with interactive questions and answers, and short quizzes	1,2,3,5,6	In lectures, students are introduced to the <i>knowledge</i> of the telecommunication field; <i>comprehension</i> of the knowledge is strengthened with interactive Q&A and short quizzes. The students will be able to <i>define</i> and <i>describe</i> key terms and concepts about telecommunication. They will also be able to <i>explain</i> and <i>generalize</i> knowledge about telecommunication (e.g. different modulation techniques and their performance, difference between analog and digital modulation techniques)	Tutorials where case studies are conducted, and problems are given to students for them to solve	1,2,3,4,5,6	In tutorials, students <i>apply</i> what they have learnt in analyzing cases (e.g. superheterodyne receiver structure) and solving problems (e.g. calculating the channel capacity of a given channel). They will <i>analyze</i> the given information, <i>compare</i> and <i>contrast</i> different scenarios and propose solutions or alternatives.	Laboratories, where students will conduct experiments on digital communication systems	2,3,4,5,6	By performing hands-on authentic tasks, the students will be able to <i>synthesize</i> a structure of knowledge by <i>designing</i> a solution to a communication problem. They will <i>relate</i> the observation to theories and principles. They will also <i>evaluate</i> outcomes of the tasks they perform and <i>interpret</i> the data they gather.	Assignment/ homework, online quizzes, tests, end-of-chapter problems	1,2,3,4,5,6	Through working assignment and homework, online quizzes, and end-of-chapter problems in text books, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught. They will <i>analyze</i> given information and <i>apply</i> knowledge in solving problems. For some design type of questions (e.g. design a communication link with a given S/N ratio), they will have to <i>synthesize</i> solutions by <i>evaluating</i> different alternatives.		
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
		1	2	3	4	5	6
1. Continuous Assessment (total 50%)							
• Assignments	10%	✓	✓	✓	✓	✓	
• Laboratory report	10%		✓	✓	✓	✓	✓
• Quiz	10%	✓	✓	✓	✓	✓	
• Test	20%	✓	✓	✓	✓	✓	
2. Examination	50%	✓	✓	✓	✓	✓	
Total	100 %						

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

Specific Assessment Methods/Tasks	Remark
Assignment/ Homework/ tests/examination	Assignment/Homework, tests, and examinations are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> , ability to <i>analyze</i> given information, ability to <i>apply</i> knowledge and skills in new situation, ability to <i>synthesize</i> structure, and ability to evaluate given data to make judgment. The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) of achievement will be graded according to six levels: Excellent (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 report	Students are required to conduct experiments in team of 2 students each in four laboratory sessions. The emphasis is on assessing their ability to <i>apply</i> knowledge and skills learned in <i>designing</i> , <i>synthesizing</i> and <i>evaluating</i> , ability in working with other people, and ability to take data and relate the measurement results to theory. Expectation and grading criteria will be given as in the case of assignment/ homework.

Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Recommended Textbook: 1. J.G. Proakis and M. Salehi, <i>Communication Systems Engineering</i> , Prentice Hall, 2002. Reference Books: 1. R.E. Ziemer, W.H. Tranter, <i>Principles of Communications: Systems, Modulation and Noise</i> , 5 th ed., New York : John Wiley & Sons, c2002. 2. A.B. Carlson, P.B. Crilly and J.C. Ruthledge, <i>Communication Systems: an introduction to signals and noise in electrical communication</i> , 4 th ed., McGraw-Hill, 2002. 3. S. Haykin, <i>Communication Systems</i> , 4 th ed., John Wiley & Sons, 2001. 4. W.D. Stanley and J.M. Jeffords, <i>Electronic Communications: Principles and Systems</i> , Thomson Delmar Learning, 2006.	
Last Updated	March 2018	
Prepared by	Dr W.C. Lee	

Subject Description Form

Subject Code	EIE3333
Subject Title	Data and Computer Communications
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide solid foundation to students about the architectures and operations of communication networks. 2. To enable students to master the knowledge about computer networking in the context of real-life applications. 3. To prepare students to learn and to critically evaluate new knowledge and emerging technology in communication networks.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the services, functions, and inter-relationship of different layers in communication network models 2. Describe how components in different layers inter-operate and analyze their performance. 3. Understand and apply the principles and practices of communication networks. 4. Learn new techniques and to align new technologies to existing network infrastructure. <u>Category B: Attributes for all-roundedness</u> 5. Present ideas and findings effectively. 6. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Computer Networks, Services, and Layered Architectures</u> Evolution of networking and switching technology. Protocol and services. Layered network architectures: OSI 7-layer model, TCP/IP architecture. 2. <u>Digital Transmission and Protocols in Data Link Layer</u> Line coding techniques, error detection and correction. Automatic Repeat Request (ARQ) protocol and reliable data transfer service. Sliding-window flow control. Framing and point-to-point protocol, flow control and error controls. High level data link control (HDLC) protocol and point-to-point protocol (PPP). 3. <u>Local Area Networks (LANs) and Wireless LANs</u> Media Access Control (MAC) protocols: the IEEE802.3 Ethernet and IEEE802.11 wireless LAN standards. Interconnection of LANs: bridge, switch, and virtual LAN. 4. <u>Network Layer Protocols</u> Network layer operations, connection oriented and connectionless services. Internet protocol (IP): IP datagram format, IP addressing, subnetting, IP routing and router operations. Internet control message protocol (ICMP), dynamic host configuration protocol (DHCP), network address translation (NAT). 5. <u>Transport Layer Protocols</u> Transmission control protocol (TCP) and user datagram protocol (UDP)

	Possible Laboratory Experiments: 1. Cisco router configuration and programming. 2. Static and Dynamic routing. 3. Network monitoring and analysis 4. Address resolution, ARP, IP, and TCP.							
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. 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	5, 6	Students will conduct practical exercises to reinforce concepts and techniques learned.					
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%						
	• Tests		✓	✓	✓	✓	✓	
	• Assignments		✓	✓	✓	✓	✓	
	• Laboratories				✓		✓	✓
	2. Examination	60%	✓	✓	✓	✓	✓	
	Total	100%						
	The continuous assessment will consist of a number of assignments, laboratory reports, case study reports (administered in tutorial sessions), and two tests.							

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/ Tasks	Remark
	Assignments, Tests and examination	These can measure the students' understanding of the theories and the concepts of the subject. End-of-chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; Assignments of reading report type to assess students' ability in acquiring new knowledge related to communication networks; Students need to think critically and creatively in order to come with an alternate solution for an existing problem.
	Laboratory sessions	Each group of students is required to complete work-sheets, to indicate their understanding and correct completion of the laboratories. Accuracy and the presentation of the work-sheets will be assessed;
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbook : 1. Behrouz A. Forouzan, <i>Data Communications & Networking</i> , 5 th ed., McGraw-Hill, 2012. Reference Books: 1. Behrouz A. Forouzan, <i>Computer Networks: A Top-Down Approach</i> , McGraw-Hill, 2012. 2. William Stallings, <i>Data and Computer Communications</i> , 9 th ed., Pearson/Prentice-Hall, 2012. 3. Douglas Comer, <i>Computer Networks and Internets</i> , 5 th ed., Pearson/Prentice-Hall, 2009.	
Last Updated	December 2016	
Prepared by	Dr K.T. Lo	

Subject Description Form

Subject Code	ELC3521
Subject Title	Professional Communication in English
Credit Value	2
Level	3
Pre-requisite / Co-requisite	English LCR subjects
Objectives	This subject aims to develop the language competence for professional communication in English required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals.
Intended Subject Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in English, students will be able to: 1. Plan, organise and produce professionally acceptable project proposals with appropriate text structures and language for different intended readers 2. Plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences 3. Adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis / Indicative Syllabus	1. Project proposal in English • Planning and organising a project proposal • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the current situation or existing literature to substantiate a project proposal • Describing the methods of study • Describing and discussing anticipated project results and (if applicable) results of a pilot study • Presenting the budget, schedule and (if applicable) method of evaluation • Writing an executive summary 2. Oral presentation of project proposal in English • Selecting content for an audience-focused presentation • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in a team presentation • Using effective verbal and non-verbal interactive strategies
Teaching/Learning Methodology	The subject is designed to develop the English language skills, both oral and written, that students need to use to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects. The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations. The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an

	engineering-related project to different intended readers/audiences. During the course, students will be involved in: • planning and researching the project • writing project-related documents such as project proposals • giving oral presentations to intended stakeholders of the project					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
				1	2	3
	1. Project proposal in English		40%	✓		✓
	2. Oral presentation of project proposal in English		60%		✓	✓
	Total		100%			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessments will arise from a course-long engineering-related project. Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. They will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences.					
Assessment type		Intended readers/audience	Timing			
1. Project proposal in English Each team writes a proposal of 2000-2500 words; and each member writes a report of 200-250 words explaining his/her contribution to the project		Mainly engineering experts	Week 8			
2. Oral presentation of project proposal in English Each team delivers a speech (30 minutes for a team of four), simulating a presentation of the final proposal		Mainly non-experts	Weeks 12-13			

Student Study Effort Expected	Class contact:	
	Seminars	26 Hours
	Other student study effort:	
	- Researching, planning and writing the project - Rehearsing the presentation	52 Hours
	Total student study effort:	78 Hours
Reading List and References	1. D.F. Beer, (Ed.), <i>Writing and speaking in the technology professions: A practical guide</i>, 2nd ed., Hoboken, NJ: Wiley, 2003. 2. R. Johnson-Sheehan, <i>Writing proposals</i>, 2nd ed., New York: Pearson/Longman, 2008. 3. S. Kuiper, <i>Contemporary business report writing</i>, 3rd ed., Cincinnati, OH: Thomson/South-Western, 2007. 4. M.S. Lawrence, <i>Writing as a thinking process: Teacher's manual</i>. Ann Arbor, Mich: University of Michigan Press, 1975. 5. D.C. Reep, <i>Technical writing: Principles, strategies and readings</i>, 6th ed., Pearson, Longman, 2006.	
Last Updated	July 2018	
Prepared by	English Language Centre	

Subject Description Form

Subject Code	ENG3003
Subject Title	Engineering Management
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with: 1. A practical introduction to management and a comprehensive guide to the tools and techniques used in managing people and other resources. 2. Opportunities to trace the historical development and describe the functions of management, from planning, and decision making to organizing, staffing, leading, motivating, and controlling. It also includes a discussion on engineering ethics. 3. Opportunities to explore the core business strategy, technology, and innovation, and examine how these functions intertwine to play a central role in structural design, as well as supporting an organization's overall success.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Perform tasks in an organization related to organizing, planning, leading 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 behaviors 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> Change leadership; Organizational change; Phases of planned change; 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

Teaching/Learning Methodology	A mixture of lectures, tutorial exercises, and case studies are used to deliver various topics in this subject. Some topics are covered by problem-based format whenever applicable in enhancing the learning objectives. Other topics are covered by directed study so as to develop students’ “life-long learning” ability. The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related and applied in real life situations.																												
Assessment Methods in Alignment with Intended Learning Outcomes	<table><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. Coursework - Group learning activities (10%) - Presentation (individual) (30%) </td><td>40%</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.	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Coursework - Group learning activities (10%) - Presentation (individual) (30%)	40%	✓	✓	✓	✓	2. Final examination	60%	✓	✓	✓	✓	Total	100%				
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		1	2	3	4																								
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2. Final examination	60%	✓	✓	✓	✓																								
Total	100%																												

Student Study Effort Expected	Class contact:	
	• Lectures and review	27 Hours
	• Tutorials and presentations	12 Hours
	Other student study effort:	
	• Research and preparation	30 Hours
	• Report writing	10 Hours
	• Preparation for oral presentation and examination	37 Hours
	Total student study effort:	116 Hours
Reading List and References	1. John R. Schermerhorn, Jr., 2013, Introduction to Management, 12th ed., John Wiley 2. Robbins, S P, DeCenzo, D A, and Coulter, M, 2013, Fundamentals of Management Essential Concepts and Applications, 8th ed., Pearson 3. Morse, L C and Babcock, D L, 2010, Managing Engineering and Technology: an Introduction to Management for Engineers, 5th ed., Prentice Hall 4. White, M A and Bruton, G D, 2011, The Management of Technology and Innovation: A Strategic Approach, 2nd ed., South-Western Cengage Learning	
Last Updated	July 2016	
Prepared by	Faculty of Engineering	

Subject Description Form

Subject Code	ENG3004
Subject Title	Society and the Engineer
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject is designed for engineering students as a complementary subject on the role of the professional engineer in practice and their responsibilities toward the profession, colleagues, employers, clients, and the public. The objectives of the subject are to enable students to 1. appreciate the historical context of modern technology and the nature of the process whereby technology develops and the relationship between technology and the environment, as well as the implied social costs and benefits; 2. understand the social, political, legal, and economic responsibilities and accountability of the engineering profession and the organizational activities of professional engineering institutions; 3. be aware of the short-term and long-term effects related to safety and health, and the environmental impacts of technology; 4. observe professional conduct, as well as the legal and other applicable constraints, related to various engineering issues; and 5. develop a strong vision to optimize their contribution to sustainable development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to 1. identify and evaluate the effects of technology as it applies to the social, cultural, economic, legal, health, safety, and environmental dimensions of society; 2. explain the importance of local and international professional training, professional conduct and ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; 3. evaluate and estimate, in a team setting, the impact of contemporary issues, planned projects, and unforeseen technological advances related to engineers; effectively communicate and present the findings to laymen and peers.

Subject Synopsis/ Indicative Syllabus	1. <u>Impact of Technology on Society</u> Historical cases and trends of technological innovation explored through their impact on social and cultural developments of civilization and their commonalities. 2. <u>Environmental Protection and Related Issues</u> Roles of the engineer in energy conservation, ecological balance, and sustainable development. 3. <u>Global Outlook for Hong Kong's Economy and Industries</u> Support organizations, policies and their impacts on industrial and economic development in Greater China, the Pacific Rim, and the world. 4. <u>Regulatory Organizations and Compliance</u> Discussion of engineer's responsibilities within different regulatory frameworks and environments; Examples from various entities such as the Labor Department and the Occupational Health and Safety Council; Legal dimensions to engineering such as liability, contract law, and industrial legislation. 5. <u>Professional Institutions</u> Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers. 6. <u>Professional Ethics</u> Prevention of bribery and corruption; The work of the Independent Commission Against Corruption (ICAC); Social responsibilities of engineers.
Teaching/Learning Methodology	Class comprises short lectures to provide essential knowledge and information on the relationships between society and the engineer under a range of dimensions. Other methods include discussions, case studies, and seminars to develop students' in-depth analysis of the relationships. Each student will submit two assignments based on their weekly learning activities, which will be part of the subject's evaluation. The assignments will deal with important issues of social, cultural, economic, legal, health, safety, and environmental dimensions of society. Students are assembled into groups; throughout the course, they will work on engineering cases by completing the following learning activities: 1. Case analysis where students explore the relationships between society and the engineering issues of a project under specific dimensions; 2. Construction and assembly of a case portfolio which includes i. Presentation slides ii. Feedback critiques iii. Weekly summary reports iv. A report on Sustainable Development v. Individual Reflections 3. Final oral presentation

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
			1	2	3
	1. Continuous assessment	70%			
	• Group weekly learning activities	(20%)	✓	✓	✓
	• Individual Assignments (2)	(20%)	✓	✓	
	• Individual final presentation	(15%)	✓	✓	
	• Individual reflection statement	(5%)	✓	✓	
	• Group project and SD reports	(10%)	✓	✓	✓
	2. Examination	30%	✓	✓	
	Total	100%			
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The coursework requires students to work in groups to study cases from the perspectives of the eight dimensions in an engineering setting. Based on these exercises, students' ability to apply and synthesize acquired knowledge can be assessed through their performance during groups' discussion, oral presentations, and the quality of their portfolio reports on the case studies. The open-book examination is used to assess students' critical thinking and problem-solving skills when working on their own.					
Student Study Effort Expected	Class contact:				
	• Lectures and review		27 Hours		
	• Presentation		12 Hours		
	Other student study efforts:				
	• Research and preparation		55 Hours		
	• Report and Assignments writing		25 Hours		
	Total student study effort		119 Hours		

Reading List and References	Reference Books & Articles: 1. Education for Sustainable Development - An Expert Review of Processes and Learning, UNESCO, 2011 2. Poel, Ibo van de, and Lambèr M. M. Royakkers. Ethics, Technology, and Engineering : an Introduction. Wiley-Blackwell, 2011 3. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010 4. Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, 2005 5. Securing the future: delivering UK sustainable development strategy, 2005 6. Johnston, F S, Gostelow, J P, and King, W J, 2000, <i>Engineering and Society Challenges of Professional Practice</i>, Upper Saddle River, N.J.: Prentice Hall 7. Hjorth, L, Eichler, B, and Khan, A, 2003, <i>Technology and Society A Bridge to the 21st Century</i>, Upper Saddle River, N.J.:Prentice Hall 8. The Council for Sustainable Development in Hong Kong, http://www.enb.gov.hk/en/susdev/council/ 9. Poverty alleviation: the role of the engineer, http://publications.arup.com/publications/p/poverty_alleviation_the_role_of_the_engineer Reading materials: Engineering journals: - Engineers by The Hong Kong Institution of Engineers - Engineering and Technology by The Institution of Engineers and Technology Magazines: Time, Far East Economic Review Current newspapers: South China Morning Post, China Daily, Ming Pao Daily
Last Updated	August 2018
Prepared by	Faculty of Engineering

Subject Description Form

Subject Code	IC382
Subject Title	Multidisciplinary Manufacturing Project
Credit Value	3 Training Credits
Level	3
Pre-requisite	IC348 or IC2114 or IC381
Objectives	The subject provides opportunity for students to work in a multidisciplinary project team to accomplish realistic engineering goals. Through the project, students will apply and integrate the engineering knowledge and practical skills acquired from prior engineering subjects and industrial trainings. Students will also be able to analyse engineering problems from multiple perspectives, and synthesize a solution from ideas contributed by teammates of multiple disciplines.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply engineering knowledge in carrying out an industrial project starting from problem definition, design, manufacturing, down to assembly, testing and evaluation; 2. Select and use appropriate technology building blocks, components and manufacturing processes to develop a solution to meet given specifications and constraints; 3. Work collaboratively and effectively in a multidisciplinary team to accomplish mutual project goals; and 4. Communicate effectively in a multidisciplinary project team.
Subject Synopsis/ Indicative Syllabus	Students will be divided into groups to design and manufacture an engineering product that satisfy an existing demand in IC or a certain customer from the industry. Throughout the project, students will encounter situations that reinforce the following skills: 1) Project specification: Identification of client needs and wants; Identification of resource constraints such as time, manpower, equipment, budget; Formulation of project plan. 2) Engineering design: Selection of design methodology; collaborative design; Make-or-buy decisions; Design prototyping; Testing and simulation. 3) Product manufacturing: Material procurement; Component machining; PCB fabrication; Programming; Assembly and fine-tuning. 4) Project collaboration: Determination of project stages and milestones; CAD and PDM; Leadership and Collaborative decision making; Tolerances and fits; Project documentations.
Teaching/Learning Methodology	Students will be divided into groups of 5-8 to design and manufacture an engineering product. Each project group will be formed by students from two or more engineering streams. The project topics will be provided by the subject supervisor team. Topics will be either initiated by supervisors or by commercial clients. All topics shall demand two or more skillsets including Mechanics, Electronics, and IT. Typical topics include: automated production equipment, mobility products, robotic toys, airframe structures, cabin installations, aircraft maintenance tools, jigs and gauges, etc. The subject is divided into two stages:

	• Design Stage During this period, the project team, under the guidance of the supervisors and clients, have to discover, understand and analyze the requirement of the project; and apply their knowledge to design a solution. Furthermore, students are required to search and track down parts and components with suppliers to obtain materials for the following manufacturing stage. • Manufacturing stage During this period, the project team will fabricate, test, and debug the product they designed. The supervisors will guide and monitor the groups on personal commitment, cooperation and coordination among team members. Regular group tutorials in the form of student-centred project meeting will be arranged between project group and respective supervisors.																																								
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">Weighting (%)</th><th colspan="4">Intended Learning Outcomes Assessed</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>1. Quality of final product</td><td>30%</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>2. Report</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>3. Presentation and demonstration</td><td>20%</td><td></td><td></td><td>✓</td><td>✓</td></tr><tr><td>4. Reflective Journal</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></table> <u>Group assessment components</u> Quality of final product will be assessed by the supervisor team during demonstration. The assessment is to determine how well the group's solution meets with client's requirement in terms of completeness and functionality. The assessment also determines how well the group has carried out the manufacturing in terms of accuracy and craftsmanship. This addresses the intended learning outcomes (1) & (2). Report submitted at the end of project will be summative evidence of how well the group applied knowledge and made decisions collectively. Compulsory report chapters include: Technical description of final design; Justification of technology building blocks used; Critical review on project execution; and Record of internal communications. This addresses the intended learning outcomes (1), (2), (3) & (4). <u>Individual assessment components</u> Oral presentation and demonstration in an exhibition booth setting allow individual members to demonstrate their ability in presenting engineering contents clearly and logically. Through Q&A session supervisors can also determine the effectiveness of individual members' effort toward the final product outcomes. This addresses the intended learning outcomes (3) & (4). Individual reflective journal serves as summative evidence of how well the student has functioned in the group and embrace the multidisciplinary collaboration concept. Compulsory journal contents include: Technical description of design and manufacturing tasks performed; Critical review of technical ideas proposed and adapted; Critical review on personal performance	Specific Assessment Methods/Tasks	Weighting (%)	Intended Learning Outcomes Assessed				1	2	3	4	1. Quality of final product	30%	✓	✓			2. Report	20%	✓	✓	✓	✓	3. Presentation and demonstration	20%			✓	✓	4. Reflective Journal	30%	✓	✓	✓	✓	Total	100%				
Specific Assessment Methods/Tasks	Weighting (%)			Intended Learning Outcomes Assessed																																					
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2. Report	20%	✓	✓	✓	✓																																				
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4. Reflective Journal	30%	✓	✓	✓	✓																																				
Total	100%																																								

	in the project execution and the collaboration experience. This addresses the intended learning outcomes (1), (2), (3) & (4).	
Student Study Effort Required	Class Contact:	
	• Project works	78 Hours
	• Tutorial	12 Hours
	Other Study Effort:	0 Hours
	Total Study Effort:	90 Hours
Reading List and References	1. E. Tebeaux and S. Dragga, 'Chapter.9 Proposals and Progress Reports', in <i>The Essentials of Technical Communication</i>, 3rd ed., New York: Oxford, 2012 2. J. Abarca et al, 'Teamwork and Working in Teams', in <i>Introductory Engineering Design: A Projects-Based Approach</i>, 3rd ed., University of Colorado at Boulder, 2000. 3. J. Tropman, <i>Effective meetings</i>. Thousand Oaks, Calif.: Sage Publications, 3rd ED. 2014. 4. P. Harpum, 'Design Management', in <i>Engineering Project Management</i>, 3rd ed., N. Smith, Ed. Oxford: Blackwell, 2008, pp. 234-254.	
Last Updated	July 2018	
Prepared by	Industrial Centre	

Subject Description Form

Subject Code	EIE4100
Subject Title	Computer Vision and Pattern Recognition
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	<u>For 42477:</u> EIE2106 Signal and System Analysis and EIE3103 Digital Signals and Systems
Objectives	1. To introduce students the fundamentals of image formation; 2. To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition; 3. To develop an appreciation for various issues in the design of computer vision and object recognition systems; and 4. To provide the student with programming experience from implementing computer vision and object recognition applications.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Comprehend the fundamentals of image formation. 2. Comprehend the major ideas, methods, and techniques of image processing and computer vision. 3. Appreciate typical pattern recognition techniques for object recognition. 4. Implement basic image processing and computer vision techniques. 5. Develop simple object recognition systems. <u>Category B: Attributes for all-roundedness</u> 6. Present ideas and findings effectively. 7. Think critically. 8. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: • <u>Image Formation and Image Models</u> Radiometry; Sources, Shadows and Shading; Colour; Cameras. • <u>Early Vision with One Image</u> Linear Filters; Edge Detection; Texture; Digital Libraries. • <u>Early Vision with Multiple Images</u> The Geometry of Multiple Views; Stereopsis. • <u>Mid-Level Vision</u> Segmentation and Fitting; Tracking with Linear Dynamic Models. • <u>High-Level Vision</u> Correspondence and Pose; Registration in Medical Imaging Systems. • <u>Finding Templates Using Classifiers</u> Classifiers; Building Classifiers from Class Histograms; Feature Selection. • <u>Category-Level Recognition</u> Current Approaches to Object Recognition; Decision Trees; Nearest Neighbour Rule (NNR); Support Vector Machine; Artificial Neural Networks; Deep Learning.

Teaching/Learning Methodology	Lectures: 1. fundamental principles and key concepts of the subject are delivered to students; 2. guidance on further readings, applications and implementation is given. Tutorials: 1. supplementary to lectures and are conducted with a smaller class size; 2. students will be able to clarify concepts and to have a deeper understanding of the lecture material; 3. problems and application examples are given and discussed Laboratory sessions: 1. students will make use of the software tools to construct simple computer vision applications.																																																																																														
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="8">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></tr><tr><td>1. Continuous Assessment (total: 45%)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Tests</td><td>25%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Assignments</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Lab exercises and lab reports</td><td>10%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>2. Examination</td><td>55%</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="8"></td><td></td><td></td></tr></table>										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: 45%)											• Tests	25%	✓	✓	✓							• Assignments	10%	✓	✓	✓			✓	✓	✓		• Lab exercises and lab reports	10%		✓	✓	✓	✓	✓	✓	✓		2. Examination	55%	✓	✓	✓							Total	100%										
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Student Study Effort Expected	Class contact (time-tabled): • Lecture • Tutorial/Laboratory/Practice Classes Other student study effort: • Lecture: preview/review of notes; homework/assignments; preparation for test/quizzes/examination • Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing Total student study effort:							24 Hours 15 hours 36 Hours 30 Hours 105 Hours																																																																																							

Reading List and References	Recommended Textbook: 1. D.A. Forsyth and J. Ponce, <i>Computer Vision: a Modern Approach</i>, Pearson, 2012. Reference Books: 1. M. Negnevitsky, <i>Artificial Intelligence: A Guide to Intelligent Systems</i>, 3rd Edition, Pearson/Addison Wesley, 2011. 2. C.M. Bishop, <i>Pattern Recognition and Machine Learning</i>, Springer, 2006. 3. L.G. Shapiro and G. Stockman, <i>Computer Vision</i>, Prentice-Hall, 2001. 4. R. Schalkoff, <i>Pattern Recognition – Statistical, Structural & Neural Approaches</i>, John Wiley, 1992. 5. C.H. Chen and P.S.P. Wang (Editors), <i>Handbook of Pattern Recognition and Computer Vision</i>, World Scientific, 2005.
Last Updated	January 2018
Prepared by	Prof. Kenneth Lam and Dr Zheru Chi

Subject Description Form

Subject Code	EIE4102
Subject Title	IP Networks
Credit Value	3
Level	4
Pre-requisite	EIE3333 Data and Computer Communications or EIE3342 Computer Network
Co-requisite/ Exclusion	Nil
Objectives	1. Give a practical treatment on the design, implementation, and management of IP networks. 2. Introduce the variety of facilities, technologies, and communication systems to meet future needs of network services. 3. Evaluate critically the performance of existing and emerging global communication networking technologies.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Describe the operational and functional attributes of different components of IP networks. 2. Evaluate critically the design, implementation, and performance of IP networks with regard to different criteria. <u>Category B: Attributes for all-roundedness</u> 3. Think and evaluate critically. 4. Take up new technology for life-long learning. 5. Work in a team, and collaborate effectively with other members.
Subject Synopsis/ Indicative Syllabus	1. <u>Basic Protocol Functions</u> IP address, IP datagram structure, basic IP operations, delivery and forwarding IP packets 2. <u>Protocols in TCP/IP</u> ARP, RARP, ICMP, IGMP, UDP, TCP 3. <u>Routing Protocols</u> RIP, OSPF, BGP, Multicast Routing 4. <u>Applications Over TCP/IP</u> DNS, TELNET, FTP, Email, HTTP 5. <u>Other Issues About IP</u> IP over ATM, Mobile IP, Multimedia, Voice over IP, SIP, H.323, IPv6, IPSec Laboratory Experiments: 1. Voice over IP Experiment 2. IP Security
Teaching/Learning Methodology	Lecture/Tutorial: 39 hours Laboratory: 2 hours (Equivalent to 6 hours spent by students in laboratory)

Assessment Methods in Alignment with 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 (total: 40%)						
	• Assignments	10%	✓	✓	✓		
	• Laboratory reports	10%		✓	✓	✓	✓
	• Tests	20%	✓	✓	✓	✓	
	2. Examination	60%	✓	✓	✓	✓	
	Total	100%					
Student Study Effort Expected	Class contact (time-tabled):						
	• Lecture						24 Hours
	• Tutorial/Laboratory/Practice Classes						15 Hours
	Other student study effort:						
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination						36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing						30 Hours
	Total student study effort:						105 Hours
Reading List and References	1. Behrouz A. Forouzan, <i>TCP/IP Protocol Suite</i> , 3 rd ed., McGraw-Hill, 2006.						
Last Updated	June 2015						
Prepared by	Dr Lawrence Cheung						

Subject Description Form

Subject Code	EIE4103
Subject Title	Mobile Computer System Architecture
Credit Value	3
Level	4
Pre-requisite	EIE2211 Logic Design or EIE2105 Digital and Computer Systems
Co-requisite/ Exclusion	Nil
Objectives	This course aims at providing students with an understanding of the hardware architecture of mobile computing systems and the techniques essential to their design and implementations.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the hardware architecture of mobile computers. 2. Understand the functions and features of different sub-systems of a mobile computer. 3. Understand the design constraints of mobile computer systems. <u>Category B: Attributes for all-roundedness</u> 4. understand the creative process when designing solutions to a problem
Subject Synopsis/ Indicative Syllabus	1. <u>Mobile Computers and Their Applications</u> Mobile computers and their applications in daily life. Complex systems and microprocessors. The embedded system design process. Formalisms for system design. 2. <u>Instruction Sets</u> ARM processor – Processor and memory organization, data operations, flow of control. TIC55x DSP – Processor and memory organization, data operations, flow of control. 3. <u>Central Processing Units</u> Programming input and output. Supervisor mode, exceptions, and traps. Co-processors. Memory system mechanisms. CPU performance. CPU power consumption. Design example. 4. <u>Bus-Based Computer Systems</u> The CPU bus. Memory devices. I/O devices. Component interfacing. Designing with microprocessors. Development and debugging. System-level performance analysis. Design example. 5. <u>Multiprocessors</u> Why multiprocessors? CPUs and accelerators. Multiprocessor performance analysis. Consumer electronics architecture. Design examples: cell phones, compact DISC and DVD players, audio players, digital still cameras, video accelerator etc. 6. <u>Networks</u> Distributed embedded architectures. Networks for embedded systems. Network-based design. Internet-enabled systems. Vehicles as networks. Sensor networks. Design example.

	7. <u>3D Graphics on Embedded Systems</u> Principle of mobile 3D graphics system design. Mobile 3D graphics APIs. Mobile 3D graphics SoC. Real chip implementations.																																														
Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures. Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate performance of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class. While lectures and tutorials will help to achieve the professional outcomes 1, 2, and 3, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.																																														
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<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: 50%)</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Homework and assignments</td><td>16%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>• Tests</td><td>18%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Laboratory exercises</td><td>16%</td><td></td><td></td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>50%</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: Assignment, homework and laboratory exercises will require students to apply what they have learnt to solve problems. There will be open-ended questions that allow students to exercise their creativity in making design. Examination and tests: They assess students' achievement of the learning outcomes more rigorously.	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Continuous Assessment (total: 50%)						• Homework and assignments	16%	✓	✓	✓	✓	• Tests	18%	✓	✓	✓		• Laboratory exercises	16%			✓	✓	2. Examination	50%	✓	✓	✓	✓	Total	100%				
Specific Assessment Methods/Tasks	% Weighting			Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)																																											
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2. Examination	50%	✓	✓	✓	✓																																										
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Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Book: 1. W. Wolf, <i>Computers as components: Principles of embedded computing system design</i> , 2 nd ed., Morgan Kaufmann, 2008. 2. J.H. Woo, J.H. Sohn, B.G. Nam and H.J. Yoo, <i>Mobile 3D graphics SoC: From algorithm to chip</i> , John Wiley & Sons, 2010.	
Last Updated	May 2018	
Prepared by	Dr Chris Chan	

Subject Description Form

Subject Code	EIE4104
Subject Title	Mobile Networking
Credit Value	3
Level	4
Pre-requisite	EIE3333 Data and Computer Communications or EIE3342 Computer Network
Co-requisite/ Exclusion	Nil
Objectives	1. Introduce the basic knowledge of mobile networks. 2. Introduce the variety of facilities, technologies, and communication systems to meet future needs of mobile network services. 3. Evaluate critically the performance of existing and emerging global mobile networking technologies.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Describe the operational and functional attributes of different components of mobile networks. 2. Evaluate critically the design, implementation, and performance of mobile networks with regard to different criteria. <u>Category B: Attributes for all-roundedness</u> 3. Think and evaluate critically. 4. Take up new technology for life-long learning. 5. Work in a team, and collaborate effectively with other members.
Subject Synopsis/ Indicative Syllabus	1. <u>Mobile Communication Systems</u> Handoff schemes, allocation of resources, routing, security 2. <u>Existing Wireless Systems</u> AMPS, GSM, PCS, 3G, GPS, TCP over Wireless 3. <u>Ad Hoc and Sensor Networks</u> Characteristics of Ad Hoc networks, Ad Hoc routing, characteristics of sensor networks, MAC protocol for wireless sensor networks 4. <u>Wireless MANs, LANs, and PANs</u> WMANs, WLANs, WPANs 5. <u>Recent Advances</u> Ultra-wideband technology, multicast in wireless networks, mobility (location) management, Bluetooth networks, threads and security issues Laboratory Experiments: 1. Computing efficiency and throughput of MAC protocols for wireless networks 2. Location determination of a mobile station

Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures. Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate the vulnerability of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class. While lectures and tutorials will help to achieve the professional outcomes, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.																																																												
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="5">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></tr><tr><td>1. Continuous Assessment (total: 40%)</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Assignments</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>• Laboratory Reports</td><td>20%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>• Tests</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>Total</td><td>100%</td><td colspan="5"></td></tr></table>							Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					1	2	3	4	5	1. Continuous Assessment (total: 40%)							• Assignments	10%	✓	✓	✓			• Laboratory Reports	20%		✓	✓	✓	✓	• Tests	10%	✓	✓	✓	✓		2. Examination	60%	✓	✓	✓	✓		Total	100%					
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Reading List and References	1. D.P. Agrawal and Q. Zeng, <i>Introduction to Wireless and Mobile Systems</i> , 4 th ed., Cengage Learning, 2016.																																																												
Last Updated	August 2017																																																												
Prepared by	Dr Ivan Ho																																																												

Subject Description Form

Subject Code	EIE4105
Subject Title	Multimodal Human Computer Interaction Technology
Credit Value	3
Level	4
Pre-requisite	EIE3312 Linear Systems or EIE3103 Digital Signals and Systems
Co-requisite/ Exclusion	Nil
Objectives	This course aims at providing students with a basic understanding of the theory and applications of multimodal human computer interaction (HCI) technologies.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the benefits of using multimodal HCI. 2. Understand the basic theories in statistical learning. 3. Have basic understanding of speech recognition, speaker recognition, handwriting recognition and face recognition. <u>Category B: Attributes for all-roundedness</u> 4. Understand the creative process when designing solutions to a problem.
Subject Synopsis/ Indicative Syllabus	1. <u>Multimodal HCI Inputs and Their Applications</u> Applications of multimodal HCI interfaces in daily life. Advantages of multimodal input interfaces. Understanding multimodal input behaviour. Trends in HCI technologies. 2. <u>Fundamental of Statistical Learning</u> Probability and random variables. Probability densities and distributions. Sampling distributions. Expectations and covariance. Bayes rule and Bayes decision theory. Curse of dimensionality. 3. <u>Statistical Machine Learning for HCI</u> Structure of pattern recognition systems. Unsupervised Learning: principal component analysis, K-means; Gaussian mixture models; hidden Markov models. Supervised Learning: linear regression; linear discriminant analysis; support vector machines. Deep Learning: deep neural networks (DNN); restricted Boltzmann machines; backpropagation. Applications to handwriting recognition. Applications to face recognition. Eigenface. Fisherface. 4. <u>Speech Recognition and Its Applications</u> Acoustic feature extraction. HMM for acoustic modelling. DNN for acoustic modelling. Language modelling. Applications: voice search, voice conversion, spoken dialog, speech emotion recognition 5. <u>Speaker Recognition and Its Applications</u> Acoustic features for speaker recognition. GMM-UBM systems. Factor analysis and i-vectors. Probabilistic linear discriminant analysis (PLDA). DNN for speaker recognition. Applications: biometric authentication; forensic.

Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics. This will help strengthen the knowledge taught in lectures. Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate performance of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class. While lectures and tutorials will help to achieve the professional outcomes, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.																																														
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<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: 50%)</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Homework and assignments</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>• Tests and Quizzes</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>• Laboratory exercises</td><td>15%</td><td></td><td></td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>50%</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: Assignment, homework and laboratory exercises will require students to apply what they have learnt to solve problems. There will be open-ended questions that allow students to exercise their creativity in making design. Examination and tests: They assess students' achievement of the learning outcomes in a more formal manner.	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Continuous Assessment (total: 50%)						• Homework and assignments	15%	✓	✓	✓	✓	• Tests and Quizzes	20%	✓	✓	✓		• Laboratory exercises	15%			✓	✓	2. Examination	50%	✓	✓	✓	✓	Total	100%				
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Reading List and References	Reference Materials: 1. S.Y. Kung, M.W. Mak and S.H. Lin, <i>Biometric Authentication: A Machine Learning Approach</i>, Prentice Hall, 2005. 2. Spoken Language Technology, <i>IEEE Signal Processing Magazine</i>, vol. 25, No. 3, May 2008. 3. C.M. Bishop, <i>Pattern Recognition and Machine Learning</i>, Springer, 2006. 4. J.P. Thiran, F. Marques and H. Bourlard, <i>Multimodal Signal Processing, Theory and Applications for Human Computer Interaction</i>, Elsevier, 2010. 5. S.B. Wan and M.W. Mak, <i>Machine Learning for Protein Subcellular Localization Prediction</i>, De Gruyter, 2015. 6. M.W. Mak, "Lecture Notes on Factor Analysis and I-Vectors", <i>Technical Report and Lecture Note Series, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University</i>, Feb. 2016. 7. M.W. Mak, "Lecture Notes on Backpropagation", <i>Technical Report and Lecture Note Series, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University</i>, July 2015.
Last Updated	March 2016
Prepared by	Dr M.W. Mak

Subject Description Form

Subject Code	EIE4106
Subject Title	Network Management and Security
Credit Value	3
Level	4
Pre-requisite	EIE3333 Data and Computer Communication or EIE3342 Computer Network
Co-requisite/ Exclusion	Nil
Objectives	This course aims at training students to master the basic principles, knowledge, and skills about network management and network security. They will learn how to apply these principles in various scenarios by using appropriate hardware and software tools to design solutions for network management and security problems, and to evaluating performance.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Describe some common features about network management systems 2. Perform basic network management tasks with appropriate tools 3. Describe some network security services and functions 4. Analyze and evaluate some common security features of computer networks 5. Design simple network management and security systems <u>Category B: Attributes for all-roundedness</u> 6. Communicate Effectively 7. Understand the creative process when designing a solution to a problem
Subject Synopsis/ Indicative Syllabus	1. <u>Network Management</u> Functional areas in network management, network management station, agent, management information base (MIB), Simple Network Management Protocol (SNMP) 2. <u>Network Security</u> Security services and mechanisms, basic cryptography, authentication protocols, digital signature and public key infrastructure, firewall and virtual private network (VPN)
Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures. Laboratory: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate performance of systems and design solutions to problems.

Assessment Methods in Alignment with 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 (total: 50%)									
	• Homework and assignments	15%	✓		✓	✓	✓	✓	✓	
	• Tests	20%	✓		✓	✓		✓		
	• Laboratory exercises	15%		✓			✓		✓	
	2. Examination	50%	✓		✓	✓	✓	✓	✓	
	Total	100%								
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:									
	Assignment and homework will require students to apply what they have learnt to solve problems. They will be asked to evaluate the security features of a system, to design a system to meet network management and security requirements.									
Laboratory exercises: Students will be assessed about their performance on hands-on tasks such as setting up a VPN, capturing and analyzing packets, setting up a network management system.										
Tests will require the students to solve network management and security problems within a specific time and without access to other materials. This is a good way to assess students' mastery of knowledge and understanding.										
Examination: This is similar to tests but in a larger scale. It can assess students' achievement of the learning outcomes in a wider spectrum.										
Student Study Effort Expected	Class contact (time-tabled):									
	• Lecture								24 Hours	
	• Tutorial/Laboratory/Practice Classes								15 Hours	
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Reading List and References	Text Book: 1. Perez, Andre, <i>Network Security</i>, London: Hoboken, NJ: ISTE; Wiley 2014 (eBook, online access) 2. Subramanian, Mani, <i>Network management : principles and practice</i>, Pearson, 2nd ed., 2011 (PolyU Library Acc. No.: TK5105.5 .S92 2011). 3. <i>Network security, administration, and management advancing technology and practice</i>, InfoSci-Books. ; MyiLibrary, Information Science Reference, 2011 (eBook, online access). 4. Behrouz A. Forouzan, <i>Introduction to cryptography and network security</i>, New York: McGraw-Hill Higher Education, 2008 (PolyU Library Acc. No.: TK5105.59 .F672 2008). General References and standards: 1. Ding, Jianguo, <i>Advances in network management</i>, Books24x7, CRC Press : Auerbach Publications, 2010 (eBook, online access). 2. Clemm, Alexander, <i>Network Management Fundamentals</i>, Indianapolis, Ind.: Cisco Press, 2007 (PolyU Library Call Number: TK5105.5 .C576 2007) 3. Yusuf Bhajji, <i>Network security technologies and solutions</i>, Indianapolis, IN: Cisco Press, 2008 (PolyU Library Call Number: TK5105.59 .B468 2008). 4. James Henry Carmouche, <i>IPsec virtual private network fundamentals</i>, Indianapolis, Ind.: Cisco Press, 2007 (PolyU Library Call Number: TK5105.567 .C37 2007). Classics Paper 1. Shannon, Claude Elwood, <i>Claude Elwood Shannon: collected papers</i>, Institute of Electrical and Electronics Engineers, c1993 (PolyU Library Call Number: TK5101 .S448 1993).
Last Updated	June 2016
Prepared by	Dr C.K. Leung

Subject Description Form

Subject Code	EIE4108
Subject Title	Distributed Systems and Cloud Computing
Credit Value	3
Level	4
Pre-requisite	EIE3320 Object Oriented Design and Programming
Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with the principles of distributed systems and cloud computing. It enables students to master the development skills for providing and constructing distributed services on the Web and cloud. Through a series of lab exercises, students will be able to develop interoperable and distributed Web and cloud applications.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the concepts of distributed systems, cloud computing, and big data 2. Identify the key components in distributed systems, cloud services, and big data analytics 3. Build distributed systems. 4. Understand the advantages and limitations of different distributed system and cloud architectures. 5. Understand the enabling technologies for building distributed systems. 6. Understand the different components of distributed systems. 7. Set up and configure a distributed application. <u>Category B: Attributes for all-roundedness</u> 8. Think critically. 9. Learn independently. 10. Work in a team and collaborate effectively with others. 11. Present ideas and findings effectively.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to Distributed Systems and Cloud Computing</u> 1.1. Definition and examples of distributed systems; 1.2. Technologies for Network-Based Systems: multi-core and multi-threading; virtual machines; 1.3. Distributed and Cloud Computing Models: client-server; clusters; grids; peer-to-peer 2. <u>Enabling Technologies for Building Distributed Systems</u> 2.1. Socket Programming: datagram sockets; stream-mode sockets 2.2. Remote Method Invocation 2.3. Extensible Markup Language (XML): XML markup; XML namespaces; XML schema 3. <u>Service-Oriented Architecture for Distributed Computing</u> 3.1. Service and Service-Oriented Architectures 3.2. Web Services: simple object access protocol (SOAP); building web services with SOAP; web services description language (WSDL); role of WSDL in Web services; remote web-services invocation using WSDL; Web service implementation 3.3. RESTful Web Services: architectural principles of REST; REST vs. SOAP; AJAX; RESTful implementation; JAX-RS

	4. <u>Cloud Platform Architecture and Programming Environments</u> 4.1. Service Models: public clouds; private clouds; hybrid clouds 4.2. Data Centres 4.3. Virtualization: level of virtualization; hardware virtualization; server and storage consolidation; 4.4. Layer and Types of Clouds: IaaS; PaaS; SaaS 4.5. Cloud Programming Environments: Google App Engine; 5. <u>Big Data Analytics</u> 5.1. Introduction to Big Data: big data use cases; source of big data 5.2. Storing Big Data: unstructured databases; NoSQL; CAP theorem; key-value stores; document stores 5.3. Distributed Computing with MapReduce: map and reduce tasks 5.4. Hadoop: Hadoop clusters; Hadoop distributed file systems; implementation examples Programming Exercises and Laboratory Experiments: 1. Multi-Threading 2. Socket Programming 3. Remote Method Invocation (RMI) 4. Web Services																																																																																																																			
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Student Study Effort Expected	Class contact (time-tabled):									
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	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours								
	Total student study effort:	105 Hours								

Reading List and References	Reference Books: 1. M.P. Papazoglou, <i>Web Services and SOA: Principles and Technology</i>, 2nd Edition, Prentice-Hall, 2013. 2. G. Coulouris, <i>Distributed Systems: Concepts and Design</i>, 5th ed., Addison-Wesley, 2011. 3. A.S. Tanenbaum and M. Van Steen, <i>Distributed Systems: Principles and Paradigms</i>, Prentice-Hall, 2007. 4. T. Erl, <i>Cloud Computing: Concepts, Technology and Architecture</i>, Prentice-Hall, 2013. 5. V. Mayer-Schönberger and K. Cukier, <i>Big Data: A Revolution That Will Transform How We Live, Work, and Think</i>, John Murray Pub., 2013. 6. T. White, "Hadoop: The Definitive Guide", O'Reilly, 3rd Ed. 2012
Last Updated	February 2018
Prepared by	Dr M.W. Mak

Subject Description Form

Subject Code	EIE4110
Subject Title	Introduction to VLSI and Computer-Aided Circuit Design
Credit Value	3
Level	4
Pre-requisite	EIE3100 Analogue Circuit Fundamentals
Co-requisite/ Exclusion	Nil
Objectives	To enable students to gain knowledge and understanding in the following aspects: 1. Fundamentals of VLSI circuits and systems. 2. VLSI design CAD tools. 3. Hardware Description Languages (VHDL) 4. VLSI design prototyping using Field Programmable Gate Arrays (FPGAs)
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the fundamentals of CMOS VLSI and associated technologies. 2. Solve problems in the design of CMOS logic circuits, with particular reference to speed and power consumption. 3. Acquire hands-on skills of using CAD tools in VLSI design. 4. Appreciate the design process in VLSI through a mini-project on the design of a CMOS sub-system. <u>Category B: Attributes for all-roundedness</u> 5. Communicate effectively. 6. Think critically and creatively. 7. Assimilate new technological and development in related field.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Overview of VLSI Design</u> VLSI design methodology; functional, logic and physical design; gate arrays and standard cells, programmable logic devices; system-on-chip. 2. <u>CMOS Fabrication and Layout</u> Fabrication processes in CMOS VLSI; latch-up; characteristics of devices in VLSI; mask layout techniques and design rules. 3. <u>CMOS Logic Circuits</u> Transmission gates; static and dynamic gates and flip flops; domino logic. 4. <u>High Speed CMOS Logic Design</u> Delay estimation and transistor sizing; device and interconnect capacitance; optimal delay design of buffers 5. <u>Logic Synthesis</u> Synthesis of Hardware Description Languages (HDL) e.g. VHDL or Verilog into gate-netlists. Timing and area optimizations. 6. <u>High-Level Synthesis</u> Synthesis of behavioural descriptions e.g. ANSI-C into Register Transfer Level Descriptions (i.e. synthesizable – Verilog or VHDL). Review of three main steps: (1) Resource allocation, (2)scheduling and (3) binding

	7. <u>Physical Design</u> Logic netlist partitioning methods, floor planning, placement of gate-netlists and routing 8. <u>Power Grid and Clock Design</u> Design of VLSI power grids and clock trees 9. <u>VLSI Power and Thermal Considerations</u> Power (static and dynamic power) estimation. Main factors that impact power consumption and how to reduce them e.g. Clock gating, Dynamic Voltage and Frequency Scaling (DVFS), voltage island. 10. <u>Design for Test (DFT)</u> Testability of ICs, scan chain, boundary scan, ATPG Laboratory Experiment/Mini-project: 1. Practice of CAD tools for VLSI design: circuit simulation and FPGA implementation using a FPGA prototyping board 2. Mini-project: design of a VLSI sub-system for computer or communication applications.		
Teaching/ Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
	Lectures, supplemented with interactive questions and answers, and short quizzes	1, 2, 6, 7	In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A and short quizzes. They will be able to <i>explain</i> and <i>generalize</i> knowledge in VLSI.
	Tutorials where design problems are discussed, and are given to students for them to solve	1, 2, 5, 6	In tutorials, students <i>apply</i> what they have learnt in analyzing the cases and solving the problems given by the tutor. They will <i>analyze</i> the given information, <i>compare</i> and <i>contrast</i> different scenarios and propose solutions or alternatives.
	Laboratory sessions, where students will perform a mini-project on a subsystem design using CAD tools. They will have to write a report on their mini-projects.	2, 3, 4, 5, 6	Students <i>acquire</i> hands-on experience in using CAD tools in VLSI design, and <i>apply</i> what they have learnt in lectures/tutorials to do a mini-project on the design of a sub-system.
	Assignment and Homework	1, 2, 3, 4, 5, 6	Through working assignment and homework, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught. They will <i>analyze</i> given information and <i>apply</i> knowledge in solving problem. For some design type of questions, they will have to <i>synthesize</i> solutions by <i>evaluating</i> different alternatives.

Assessment Methods in Alignment with 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 (total 50%)								
	• Min-project	20%	✓	✓	✓	✓		✓	✓
	• Individual Assignment	15%	✓	✓			✓		
	• Laboratory works and reports	15%		✓	✓	✓	✓		
	2. Examination	50%	✓	✓	✓	✓		✓	
	Total	100%							
	The continuous assessment will consist of a mini-project, a number of laboratory sessions.								
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:									
Specific Assessment Methods/ Tasks	Remark								
Mini-project	Students are required to conduct one mini-project in teams of 3-4 students. The emphasis is on assessing their ability to apply knowledge and skills learned in designing a complex VLSI system, ability in working with other people and ability to take data and relate the measurement results to theory. Expectation and grading criteria will be given.								
Individual assignment	The students will work on a small individual assignment to as demonstrate the development an analytical skills related the design of VLSI circuits.								
Laboratory works and reports	Students will be required to perform 6-7 laboratory sessions and write an individual laboratory report. The emphasis is on assessing their ability to use VLSI CAD tools effectively to perform VLSI design. Expectation and grading criteria will be given as in the case of mini-project.								
Examination	There will be an end-of-semester examination to assess students' achievement of all the learning outcomes. Expectation and grading criteria will be given as in the case of mini-project.								

Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. D.A. Hodges, H.G. Jackson and R.A. Saleh, <i>Analysis and Design of Digital Integrated Circuits</i>, 3rd ed., New York: McGraw-Hill, 2003. 2. W. Wolf, <i>Modern VLSI Design: System-on-chip Design</i>, 3rd ed., Englewood Cliffs: Prentice-Hall, 2002. 3. P. Ashenden, <i>The Designers Guide to VHDL</i>, 3rd ed., Morgan Kaufmann, 2008.	
Last Updated	June 2015	
Prepared by	Dr Benjamin CARRION SCHAFFER	

Subject Description Form

Subject Code	EIE4112
Subject Title	Avionics Systems
Credit Value	3
Level	4
Pre-requisite	AAE3005 Introduction to Aircraft Design & Aviation Systems or EIE3331/EIE3381/EIE331/EIE381 Communication Fundamentals or ME45002 Aircraft Systems
Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge of communications, electronics aspects of avionics, including aircraft instruments and integrated systems, and navigation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Possess essential knowledge and skills in the area of avionics systems; 2. Apply their knowledge, skills and hand-on experience to manufacture and maintain existing products; analyze and develop new modules and components in avionics systems for desired needs; 3. Extend their knowledge of avionics systems to different situations of engineering context and professional practice.
Subject Synopsis/ Indicative Syllabus	Regulatory Agencies & related documents: ICAO Annex 10, FAA, RTCA; Concept of TSO; ARINC; DO-160. Airborne Communications Systems: VHF & HF transceivers, VDL modes; NAVCOM; EPIRB. Terrestrial Radio Navigation & Landing Aids: NDB; VOR; DVOR; DME; ILS & GP; Radar altimeters & AID. Satellite Navigation: Introduction to GNSS and its impacts on Performance-based navigation – RNAV & RNP. Surveillance Systems: Primary & Secondary Radars; ATCRBS replies; TCAS; ADS-B. Cockpit Integration: Display technologies; Instrument Placement. On Board Data Buses: ARINC 429; ARINC 629; ARINC 825 CAN Bus. Electronic Flight Control: FBW flight control features. Control laws. Safety and integrity. Redundancy and failure survival. Digital implementation and problems. Flight control software functions. Case study: • Case study on an avionics system/avionics subsystem/avionics component

Teaching/Learning Methodology	1.	The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.				
	2.	The continuous assessment and examination are aimed at providing students with integrated knowledge required for avionics systems.				
	3.	Technical/practical examples and problems are raised and discussed in class/tutorial sessions.				
	Teaching/Learning Methodology		Intended subject learning outcomes			
			1	2	3	
	1.	Lecture	√	√		
	2.	Tutorial	√	√		
	3.	Homework assignment	√	√		
4.	Case study report	√	√	√		
Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended subject learning outcomes to be assessed		
				1	2	3
	1.	Homework assignment	20%	√	√	√
	2.	Test	20%	√	√	
	3.	Case study report	20%	√	√	√
	4.	Examination	40%	√	√	√
	Total		100%			
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:					
	Overall Assessment:					
	0.40 × End of Subject Examination + 0.60 × Continuous Assessment					
	The continuous assessment consists of three components: homework assignments, test, and case study report. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.					
	The examination is used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.					
Student Study Effort Expected	Class contact:					
	• Lecture				26 Hours	
	• Tutorial				13 Hours	
	Other student study effort:					
	• Self Study				44 Hours	
	• Case Study				22 Hours	
	Total student study effort:				105 Hours	

Reading List and References	1. Helfrick A, Principles of Avionics, 7th Edition, Avionics Communications, 2012. 2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009. 3. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011. 4. Kayton Myron Walter R. Fried Avionics Navigation Systems, Second Edition, John Wiley and Son, Published online 2007.
Last Updated	August 2017
Prepared by	Dr Martin Chow

Subject Description Form

Subject Code	EIE4113
Subject Title	Wireless and Mobile Systems
Credit Value	3
Level	4
Pre-requisite	<u>For 42480</u> EIE3120 Network Technologies and Security <u>For 42470</u> EIE3333 Data and Computer Communications
Exclusion	Mobile Networking (EIE4104)
Objectives	This subject aims to provide students with an understanding of various security concerns in wireless networks (e.g., WiFi and mobile cellular networks) and mobile systems and applications (e.g., Android and iOS).
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the security threats, concerns, and vulnerabilities in wireless and mobile systems, and the corresponding security mechanisms and authentication procedures 2. Understand the strategies for developing secure mobile applications, and the use of mobile security penetration tools for evaluating the robustness of mobile applications 3. Apply the knowledge to develop practical applications that are robust against mobile platform attack tools <u>Category B: Attributes for all-roundedness</u> 4. Understand the creative process when designing solutions to a problem
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to Mobile and Wireless Networks</u> Mobile cellular networks (3G/4G LTE), IEEE wireless networks (IEEE 802.11, IEEE 802.15), mobile networks (NEMO, MANET). 2. <u>Vulnerability of Wireless Networks</u> Threats and risks to telecommunication systems, vulnerabilities from wired to wireless communications, fundamental security mechanisms. 3. <u>WiFi Security</u> Attacks on wireless networks, security in the IEEE 802.11 standard, security in 802.11i, authentication in wireless networks, layer 3 security mechanisms. 4. <u>Security in Mobile Telecommunication Networks</u> Vulnerability of signaling systems, GSM and GPRS security, 3G security, network interconnection. 5. <u>Mobile Systems and Development Strategies</u> Top issues facing mobile devices, tips for secure mobile application development, mobile HTML security, SMS security, mobile geolocation. 6. <u>Android and iOS Security</u> Android IPC mechanisms, security model, permission review, security tools. iOS security testing, application format, permissions and user controls.

	Mobile security penetration testing tools.					
Teaching/Learning Methodology	Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions and specially designed classroom activities. Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures. Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate the vulnerability of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class. While lectures and tutorials will help to achieve the professional outcomes, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.					
Assessment Methods in Alignment with 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	(50%)				
	• Homework and assignments	10%	✓	✓	✓	✓
	• Tests	10%	✓	✓		
	• Laboratory exercises	30%			✓	✓
	2. Examination	50%	✓	✓		✓
	Total:	100%				
Student Study Effort Expected	Class contact (time-tabled):					
	• Lecture			24 Hours		
	• Tutorial/Laboratory/Practice Classes			15 Hours		
	Other student study effort:					
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination			36 Hours		
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing			30 Hours		
	Total student study effort:			105 Hours		
Reading List and References	Reference Books: 1. H Chaouchi, M Laurent-Maknavicius, <i>Wireless and Mobile Network Security</i>, Wiley, 2009. 2. P. Venkataram, B. Sathish Babu, <i>Wireless and Mobile Network Security</i>, Tata McGraw-Hill, 2010. 3. H. Dwivedi, C. Clark, D. Thiel, <i>Mobile Application Security</i>, McGraw-Hill, 2010.					
Last Updated	November 2014					
Prepared by	Dr Ivan Ho					

Subject Description Form

Subject Code	EIE4114
Subject Title	Digital Forensics for Crime Investigation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students with basic concepts about digital forensic techniques for crime investigation 2. To appreciate how different forensic techniques are used for information security
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand different approaches for digital forensics 2. Use different techniques for forensic investigation <u>Category B: Attributes for all-roundedness</u> 3. Present ideas and findings effectively
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Digital and Computational Forensics Context</u> Introduction to digital and computational forensics; Historical aspects in digital and computational forensics; Introduction to techniques for multimedia manipulation; different classes of techniques for forensics: basic idea, framework and applications. 2. <u>Forensics based on Intrinsic Data</u> Models of digital data capturing device; idea of the use of intrinsic data in digital forensic investigation; introduction to forensics techniques using intrinsic data; applications in source device identification, device linking and integrity verification. 3. <u>Forensics based on Extrinsic Data</u> Introduction to techniques for multimedia content protection and authentication; different classes of watermarking techniques; performance measure; attacks modelling; copyright protection applications (e.g., ownership identification and transaction tracking). 4. <u>Digital Evidence</u> Models of digital evidence; event analytics: surveillance, monitoring, forensic and security; data evaluation from various domains (e.g., mobile phone, SMS messages and social media) for user behaviour and forensic analysis. 5. <u>Robustness of Forensic Techniques</u> Robustness and security of forensic techniques; adversary model; case studies of reliabilities of forensic techniques. Laboratory Experiments: Practical Works: 1. Evaluation of forensic techniques based on intrinsic data. 2. Evaluation of forensic techniques based on extrinsic data. 3. Forensic analysis of digital evidence.

Teaching/Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks			
	Lectures	1, 2	Fundamental principles and key concepts of the subject are delivered to students.			
	Tutorials	1, 2	Supplementary to lectures; 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	Students will evaluate different kinds of forensic techniques.			
	Mini-project	1, 2, 3	Students are required to study a problem in forensic application. Students will need to submit a written report and make a presentation.			
Assessment Methods in Alignment with Intended Subject Learning Outcomes	Specific Assessment Methods/Tasks		% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
				1	2	3
	1. Continuous Assessment (total 50%)					
	• Tests		18%	√	√	
	• Short quizzes		10%	√	√	
	• Laboratory sessions		7%		√	√
	• Mini-project		15%		√	√
	2. Examination		50%	√	√	
	Total		100%			
	The continuous assessment consists of tests, short quizzes, laboratory exercises and a mini-project.					
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:					
	Specific Assessment Methods/Tasks		Remark			
	Short quizzes		These can measure students' understanding of the theories and concepts as well as their comprehension of subject materials.			
	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 in order to come with a solution for a problem.			
	Laboratory sessions, mini-project		oral examination will be conducted to evaluate student's technical knowledge and communication skills.			

Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbooks: 1. Li Chang-Tsun, <i>“Emerging Digital Forensics Applications for Crime Protection, Prevention and Security”</i>, IGI Global 2013, doi:10.4018/978-1-4666-4006-1, 2013. 2. Li Chang-Tsun and Anthony T.S. Ho, <i>“Crime Prevention Technologies and Applications for Advancing Criminal Investigation”</i>, IGI Global 2012, doi:10.4018/978-1-4666-1758-2, 2012. Reference Books: 1. Larry Daniel and Lars Daniel, <i>“Digital Forensics for Legal Professionals”</i>, Syngress, 2011. 2. Azah Kamilah Muda, Yun-Huoy Choo, Ajith Abraham and Sargur N. Srihari (editors), <i>“Computational Intelligence in Digital Forensics: Forensic Investigation and Applications”</i>, Springer, 2014. 3. Husrev Taha Sencar and Nasir Memon (editors), <i>“Digital Image Forensics”</i>, Springer, 2013. 4. John R. Vacca, <i>“Managing Information Security”</i>, Waltham, Mass., Syngress, 2014. 5. Frank Y. Shih, <i>“Multimedia Security Watermarking, Steganography and Forensics”</i>, CRC Press, 2013.	
Last Updated	March 2018	
Prepared by	Dr Bonnie Law	

Subject Description Form

Subject Code	EIE4115
Subject Title	Intrusion Detection and Prevention
Credit Value	3
Level	4
Pre-requisite	For 42480: EIE3120 Network Technologies and Security For 42470: EIE4106 Network Management and Security
Co-requisite/ Exclusion	Nil
Objectives	1. To provide a solid foundation to the students in network security and intrusion detection and prevention 2. To enable the students to master the knowledge about intrusion detection and prevention in the context of real-life applications 3. To prepare the students for understanding, evaluating critically, and assimilating new knowledge and emerging technology in network security
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the physical location, the operational characteristics and the various functions performed by the intrusion detection/prevention system 2. Describe how components in different layers inter-operate in the intrusion detection/prevention system 3. Understand the current and effective procedures to deal with network security threats 4. Learn new techniques and to align new security technologies to existing network infrastructure <u>Category B: Attributes for all-roundedness</u> 5. Present ideas and findings effectively 6. Learn independently
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Vulnerabilities and Security Threats to Computer Networks</u> Sources of vulnerabilities, types of attacks, attacks against various security objectives, countermeasures of attacks. 2. <u>Intrusion Detection and Prevention Technologies</u> Host-based intrusion detection system (IDS) / intrusion prevention system (IPS), network-based IDS/IPS. Data collection for IDS/IPS. Intrusion detection techniques, misuse detection: pattern matching, rule-based and state-based; anomaly detection: statistical based, machine learning based, data mining based; hybrid detection. 3. <u>IDS and IPS Architecture</u> Tiered architectures, single-tiered, multi-tiered, peer-to-peer. Sensor: sensor functions, sensor deployment and security. Agents: agent functions, agent deployment and security. Manager component: manager functions, manager deployment and security. Information flow in IDS and IPS, defending IDS/IPS. 4. <u>Alert Management and Correlation</u> Data fusion. Alert correlation, pre-process, correlation techniques, post-

	process, alert correlation architectures. Cooperative intrusion detection, cooperative discovery of intrusion chain, abstraction-based intrusion detection, interest-based communication and cooperation, agent-based cooperation. 5. <u>Deployment of IDS/IPS</u> Case study on commercial and open-source IDS. Possible Laboratory Experiments: 1. Network monitoring 2. Protocol and traffic analysis Intrusion detection using Snort									
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, 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		5, 6		Students will conduct practical exercises in intrusion detection and prevention to reinforce concepts and techniques learned.					
Assessment Methods in Alignment with 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		40%							
	• Tests				✓	✓	✓	✓	✓	
	• Assignments				✓	✓	✓	✓	✓	
	• Laboratories						✓		✓	✓
	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	Mainly objective tests conducted to measure the students' understanding of the theories and concepts 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; Assignments of reading report type to assess students' ability in acquiring new knowledge related to computer networks; Students need to think critically and creatively in order to come with an alternate solution for an existing problem.
	Laboratory sessions	Each group of students is required to produce a written report; Accuracy and the presentation of the report will be assessed; Oral examination based on the laboratory exercises will be conducted for each group member to evaluate his technical knowledge and communication skills.
Student Study Effort Expected	Class contact (time-tabled):	
	1. Lecture	24 Hours
	2. Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	3. Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	4. Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. C. Endorf, E. Schultz and J. Mellander, <i>Intrusion Detection & Prevention</i>, McGraw-Hill/Osborne, 2004. 2. Ali A. Ghorbani, <i>Network intrusion detection and prevention concepts and techniques</i>, Springer, 2010. 3. J. M. Kizza, <i>Computer Network Security</i>, Springer, 2005. 4. D. Jacobson, <i>Introduction to Network Security</i>, CRC Press, 2009. 5. Chris Sanders and Jason Smith, <i>Applied Network Security Monitoring: Collection, Detection, and Analysis</i>, Syngress, 2013.	
Last Updated	July 2017	
Prepared by	Dr H. Hu	

Subject Description Form

Subject Code	EIE4116
Subject Title	Surveillance Studies and Technologies
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course aims at providing students with thorough understanding of recent surveillance technologies and their emerging trends. They will also learn the pros and cons of various surveillance technologies.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Introduce a brief history to provide context for the evolution of today's surveillance technologies 2. Understand the different surveillance technologies 3. Understand the system design principle of CCTV and other related video security and surveillance technologies <u>Category B: Attributes for all-roundedness</u> 4. Understand professional, ethical, legal, security and social issues and responsibilities
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Overview of Surveillance Studies</u> Brief history, key developments leading to current surveillance technologies; public controversy and accountability. 2. <u>Surveillance Technologies and Techniques</u> Visual surveillance; audio surveillance; aerial surveillance; radio-wave surveillance; GPS surveillance; sensors; computer, Internet and social media surveillance; data cards; biochemical surveillance; animal surveillance; Biometrics; pros and cons of surveillance technologies. 3. <u>Case Study: Video and CCTV Surveillance</u> Video's critical role in the security plan; the evolution of video and CCTV surveillance systems, network videos; cameras – analog, digital and network, cameras technologies; analog and digital video; video compression technologies; video processing equipments; video recorders, servers and storage; video management; video motion detectors; video analytics. 4. <u>Privacy and Legislation</u> Ubiquity of surveillance devices; balance between the needs of law enforcement of the privacy of law-abiding citizens. Laboratory Experiments: 1. Analysis of video compression in surveillance systems 2. Critical scene detection in surveillance systems 3. Video signal analysis.

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	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	3	students will make use of the software to develop surveillance applications.			

Assessment Methods in Alignment with 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 (total 40%)					
	• Short quizzes/ Assignments	10%	✓	✓	✓	✓
	• Tests	20%	✓	✓	✓	✓
	• Laboratory sessions	10%			✓	
	2. Examination	60%	✓	✓	✓	✓
	Total	100%				

The continuous assessment will consist of laboratory reports, a number of short quizzes, assignments, and tests.

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/Tasks	Remark
	Short quizzes	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
	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 students is required to produce a written report; accuracy and the presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each student to evaluate his/her technical knowledge and communication skills
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. J.K. Petersen, <i>Introduction to Surveillance Studies</i>, CRC Press, 2013. 2. Vlado Damjanovski, <i>CCTV: Networking and Digital Technology</i>, Elsevier, 2005. 3. Herman Kruegle, <i>CCTV Surveillance: Analog and Digital Video Practices and Technology</i>, Elsevier Butterworth-Heinemann, 2007. 4. Fredrik Nilsson and Axis Communications, <i>Intelligent Network Video: Understanding Modern Video Surveillance Systems</i>, CRC Press, 2009. 5. Daniel Neyland, <i>Privacy, Surveillance and Public Trust</i>, Palgrave Macmillan, 2006. 6. Fredrika Bjorklund and Ola Svenonius, <i>Video Surveillance and Social Control in a Comparative Perspective</i>, Routledge, 2013.	
Last Updated	November 2014	
Prepared by	Dr YL Chan	

Subject Description Form

Subject Code	EIE4402
Subject Title	Power Electronics
Credit Value	3
Level	4
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	To enable students to gain knowledge and understanding in the following aspects: 1. Fundamentals of power electronics. 2. The concepts and operating principles of power electronics circuits. 3. Design procedures and techniques of power electronics systems. Sustainable development is one of the emerging societal objectives in China and the world at large. The knowledge & experience gained from this subject provide some of the technical fundamentals to address this kind of development.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the fundamental principles and applications of power electronics circuits. 2. Solve problems and design switching regulators according to specifications. 3. Use Computer-aided techniques for the design of power converter circuits. 4. Appreciate the latest developments in power electronics. <u>Category B: Attributes for all-roundedness</u> 5. Communicate effectively. 6. Think critically and creatively. 7. Assimilate new technological and development in related field.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to Power Electronics</u> Overview of power electronics systems: applications and areas of future development. 2. <u>Basic Switching Regulator Topologies</u> Basic operations. Critical inductance criterion. Continuous- and discontinuous-conduction modes. Practical considerations. Merits and drawbacks. 3. <u>Mathematical Modelling of Switching Regulators</u> Small-signal approximation for linearity. Applications of approximation techniques. Switching regulator transfer functions and salient features. 4. <u>Switching Regulators with Transformer Isolation</u> Flyback converter. Forward converter. Half- and full-bridge converters. Push-pull converter. Areas of application. 5. <u>Feedback Control Design</u> Classical control design. Bode plot and Nyquist stability criterion. Voltage- and current-mode controls.

	6. <u>Magnetic Components</u> Inductor. Transformer. Saturation, hysteresis, and residual flux. 7. <u>Latest Development in Power Electronics</u> Laboratory Experiments: 1. Computer-aided design of switching regulator. 2. Design of a closed-loop controlled power converter circuit.		
Teaching/ Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
	Lectures, supplemented with interactive questions and answers, and short quizzes	1, 2, 6, 7	In lectures, students are introduced to the <i>knowledge</i> of the subject, and <i>comprehension</i> is strengthened with interactive Q&A and short quizzes. They will be able to <i>explain</i> and <i>generalize</i> knowledge in the design of power converter circuits.
	Tutorials where design problems are discussed, and are given to students for them to solve	1, 2, 5, 6	In tutorials, students <i>apply</i> what they have learnt in analyzing the cases and solving the problems given by the tutor. They will <i>analyze</i> the given information, <i>compare</i> and <i>contrast</i> different scenarios and propose solutions or alternatives.
	Laboratory sessions, where students will perform a mini-project by computer simulations and experimental verifications. They will have to write a report on their mini-projects.	2, 3, 4, 5, 6	Students <i>acquire</i> hands-on experience in using CAD tools in power converter design, and <i>apply</i> what they have learnt in lectures/tutorials to do a mini-project on the design of a power converter circuit.
	Assignment and Homework	1, 2, 3, 4, 5, 6	Through working assignment and homework, students will develop a firm understanding and <i>comprehension</i> of the <i>knowledge</i> taught. They will <i>analyze</i> given information and <i>apply</i> knowledge in solving problem. For some design type of questions, they will have to <i>synthesize</i> solutions by <i>evaluating</i> different alternatives.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)						
			1	2	3	4	5	6	7
	1. Continuous Assessment (total 50%)								
	• 1 Assignment	8%	✓	✓			✓	✓	
	• Laboratory works and reports	30%		✓	✓	✓	✓		
	• Mid-semester test	6%	✓	✓	✓	✓		✓	
	• End-of-semester test	6%	✓	✓	✓	✓		✓	
	2. Examination	50%	✓	✓	✓	✓		✓	
	Total	100 %							
	The continuous assessment consists of assignments, quizzes, and two tests.								
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:									
Specific Assessment Methods/Tasks	Remark								
Assignment/Homework/ Case study reports	Assignment/Homework and case study reports are given to students to assess their competence level of <i>knowledge</i> and <i>comprehension</i> , ability to <i>analyze</i> given information, ability to <i>apply</i> knowledge and skills in new situation, ability to <i>synthesize</i> structure, and ability to evaluate given data to make judgment. The criteria (i.e. <i>what</i> to be demonstrated) and level (i.e. the <i>extent</i>) 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 a mini-project and submit a report. The emphasis is on assessing their ability to <i>use</i> VLSI CAD tools effectively to perform VLSI <i>design</i> . 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.								

	Specific Assessment Methods/Tasks	Remark
	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. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignment/homework.
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. R.W. Erickson, D. Maksimovic, <i>Fundamentals of Power Electronics</i>, 2nd ed., Kluwer Academic Publishers, 2001. 2. M.K. Kazimierczuk, <i>Pulse-width Modulated DC-DC Power Converters</i>, Wiley, 2008. 3. A.I. Pressman, K. Billings, T. Morey, <i>Switching Power Supply Design</i>, 3rd ed., McGraw-Hill, 2009. 4. C. Basso, <i>Switch-Mode Power Supplies Spice Simulations and Practical Designs</i>, McGraw-Hill, 2008. 5. N.S. Nise, <i>Control System Engineering</i>, 6th ed., Wiley, 2010. 6. R.C. Dorf, R.H. Bishop, <i>Modern Control Systems</i>, 12th ed., 2010	
Last Updated	March 2014	
Prepared by	Dr K.H. Loo	

Subject Description Form

Subject Code	EIE4413
Subject Title	Digital Signal Processing
Credit Value	3
Level	4
Pre-requisite	EIE3312 Linear Systems
Co-requisite/ Exclusion	Nil
Objectives	This is an essential subject to provide fundamental digital signal processing (DSP) techniques important to many communications and multimedia subjects. Both theory and practical realisation are stressed.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the basic concepts of Fourier analysis of digital signals and apply them to practical problems. 2. Design and realize simple digital filters for practical applications. 3. Understand the importance of random signal processing in DSP, and its application in statistical measures, prediction and data modelling. 4. Design and simulate simple DSP systems. <u>Category B: Attributes for all-roundedness</u> 5. Think critically. 6. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction</u> 1.1 Why DSP? Typical DSP system. Typical steps to construct a DSP system. 2. <u>Discrete Fourier Transform and Convolution</u> 2.1 Fourier series and continuous-time Fourier transform, Gibbs phenomenon, Shannon sampling theorem. Discrete Fourier transform (DFT), properties of DFT, Fourier analysis using DFT. The fast Fourier transform (FFT) algorithm. 2.2 DSP systems. Linear convolution and its implementation. Convolution theorem. Convolution by section. 3. <u>Design of Finite Impulse-response (FIR) and Infinite Impulse-response (IIR) Digital Filters</u> 3.1 Design stages for FIR filters. Design method – Windowing. Designing low-pass, band-pass, and high-pass FIR filters. Linear phase response filters and their design. 3.2 Difference equation, impulse response and transfer function of IIR filters. IIR filter implementation. Poles, zeros and stability of IIR filters. Frequency response of IIR filters. Case study: first and second order IIR filter design. Designing higher order IIR filters. 4. <u>Random Signal Processing</u> 4.1 Revision on Random Processes, probability distribution function, expected values, variance and standard derivation. Application – Finding correlation: covariance, cross correlation, unbiased cross correlation, auto-correlation. Application – Denoising: white and coloured noises, power spectral density, periodogram, Welch's method.

	5. <u>Advanced DSP and Applications</u> To discuss not less than one of the following topics: 5.1 Architectures of digital signal processors and DSP chips. 5.2 Denoising using the Wiener filter: Basic Wiener filter theory, Wiener filter in frequency domain. Application example. 5.3 Multirate digital signal processing: Concepts of multirate signal processing, design of practical sampling rate converters. Application examples. Laboratory Experiments: The student will carry out at least three laboratory exercises on the topics below: 1. Laboratory 1: MATLAB for DSP laboratory exercises. 2. Laboratory 2: FIR filter analysis and design. 3. Laboratory 3: IIR filter analysis and design. 4. Laboratory 4: Properties of DFT and the fast Fourier transform. 5. Laboratory 5: Statistical digital signal processing.		
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	Supplementary to lectures, tutorials 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 the software tool to simulate the various theories and visualize the results.

Assessment Methods in Alignment of Assessment and Intended Subject Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="6">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></tr><tr><td>1. Continuous Assessment (total 40%)</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• Short exercises</td><td>5%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr><tr><td>• Tests</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr><tr><td>• HW Assignment</td><td>5%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td>✓</td></tr><tr><td>• Laboratory sessions</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr><tr><td>Total</td><td>100%</td><td colspan="6"></td></tr></table>	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 40%)							• Short exercises	5%	✓	✓	✓		✓		• Tests	20%	✓	✓	✓		✓		• HW Assignment	5%	✓	✓	✓		✓	✓	• Laboratory sessions	10%	✓	✓	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓		✓		Total	100%						
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	• HW Assignment	5%	✓	✓	✓		✓	✓																																																														
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Student Study Effort Expected	Class contact (time-tabled):																																																																					
	• Lecture					26 Hours																																																																
	• Tutorial/Laboratory/Practice Classes					13 Hours																																																																
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	• Lecture: preview/review of notes; homework/ assignment; preparation for tests/examination					36 Hours																																																																
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Last Updated	January 2018
Prepared by	Dr Daniel P.K. Lun

Subject Description Form

Subject Code	EIE4432
Subject Title	Web Systems and Technologies
Credit Value	3
Level	4
Pre-requisite	ENG2003 Information Technology
Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with the principles and practical programming skills of developing Internet and Web applications. It enables students to master the development skill for both client-side and server-side programming, especially for database applications. Students will have opportunity to put into practice the concepts through programming exercises based on various components of client/server web programming.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the enabling technologies for building Internet and Web database applications. 2. Understand the different components for developing client/server applications. 3. Apply the techniques and features of the client/server development languages to construct a database application based on Internet. 4. Develop the web database applications through programming exercises. <u>Category B: Attributes for all-roundedness</u> 5. Present ideas and findings effectively. 6. Think critically. 7. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Introduction to Client/Server Computing</u> The basic principles of client/server computing; Distinguished characteristics of client/server systems and application areas; Comparison of two tier versus three tier client/server solutions; Web programming model; Interactive web. 2. <u>Web Programming</u> Client-Side Web Programming: Benefits and limitation of client-side web programming. Basic concepts and development based on Java applet / JavaScript / dynamic HTML (DHTML). Server-Side Web Programming: Approaches to server-side programming. Benefits and limitations of server-side web programming. Development framework for server-side programming based on PHP / Servlet / JSP. Web application development. Development of a web application using synchronous and asynchronous techniques 3. <u>Web Database</u> Database Design and Implementation: Relation model; Mapping an ER model to relational model; Foundations of relational implementation; Structured query language.

	Web Database Applications: Multi-tier architecture; Principle of web database applications: store, manage and retrieve data. 4. <u>Data Analysis</u> Introduction to data mining; Concepts of data analysis; web data mining; Introduction to big data analysis; Techniques of big data analysis. Laboratory Experiments: Practical Works: 1. Client-side web application programming. 2. Server-side web application programming. 3. Database-driven web design. 4. Web database Applications.								
Teaching/ Learning Methodology	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks						
	Lectures	1, 2, 6	fundamental principles and key concepts of the subject are delivered to students.						
	Tutorials	1, 2, 6	supplementary to lectures; 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	3, 4, 6, 7	students will develop client-side and server-side web applications.						
	Mini-project	3, 4, 5, 6, 7	students in groups of 2/3 are required to develop a database-driven web application. Each group is required to perform a detailed study and make a presentation.						
Assessment Methods in Alignment with 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 (total 60%)								
	• Tests	18%	✓	✓	✓	✓		✓	
	• Quiz	18%	✓	✓	✓	✓		✓	
	• Laboratory sessions	6%			✓	✓		✓	✓
	• Mini-project	18%	✓	✓	✓	✓	✓	✓	✓
	2. Examination	40%	✓	✓	✓	✓		✓	
	Total	100%							
	The continuous assessment consists of tests, laboratory exercises and a mini-project.								

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/Tasks	Remark
	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, mini-project	oral examination based on the laboratory exercises will be conducted to evaluate student's technical knowledge and communication skills.
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Books: 1. Max Bramer, <i>Web Programming with PHP and MySQL: A Practical Guide</i>, Springer, 2015. 2. O'Kane, Mike, <i>A Web-based Introduction to Programming: Essential Algorithms, Syntax, and Control Structures using PHP, HTML and MySQL</i>, 3rd ed., Caroline Academic Press, 2014. 3. Nixon, Robin, <i>PHP: 20 Lessons to Successful Web Development</i>, McGraw-Hill Education, 2015.	
Last Updated	March 2018	
Prepared by	Dr Bonnie Law	

Subject Description Form

Subject Code	EIE4433
Subject Title	Honours Project
Credit Value	6
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	Engineering is the science of solve problems by applying scientific principles and technology in order to improve human life. This may take the form of invention, design, implementation, so on and so forth. It is important for students to have the chance to design and implement solutions to existing problems while considering various constraints. They will also have the chance to apply the knowledge they have learned throughout the curriculum. The Honours Project (also called Final-Year Project or FYP in short) in the curriculum is designed with the following objectives: 1. To provide the opportunity to the students so that they can apply what they have learnt in previous stages in a real-life engineering context. 2. To enable the students to acquire and practise project management skills and discipline while pursuing the Honours Project. 3. To enable the student to apply engineering knowledge in analysis of problems and synthesis of solution while considering various constraints.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the background, the requirements, objectives, and deliverables to be produced for the specific project. 2. Apply knowledge and skills relevant to electronic and information engineering to achieve the objectives of the project. 3. Learn to use new tools and facilities, and to gather new information, for the conduction of the project. <u>Category B: Attributes for all-roundedness</u> 4. Work under the guidance of a supervisor while exercising self-discipline to manage the project. 5. Communicate effectively with related parties (supervisor, peers, vendors, ..etc.). 6. Work with others (team partners, outsource company, technical support staff, ...etc.) collaboratively. 7. Realize different constraints when designing solutions.
Subject Synopsis/ Indicative Syllabus	Syllabus: The progression of the project will consist of the following stages. <u>Project Specification</u> In this stage, the student 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> 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 student 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 is competent in disseminating the results for others to review. Through this dissemination process, project achievements can be communicated, experience can be shared, knowledge and skills learnt can be retained and transferred. The following elements will be important as evidence of students' achievement: 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																																						
Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table><tr><th rowspan="2">Specific Assessment Methods/ Task</th><th rowspan="2">% Weighting</th><th colspan="7">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></tr><tr><td>Continuous Assessment</td><td>100%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="7"></td></tr></table> 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. The student will be required to give a presentation and demonstration so that he/she can communicate the project design, methodology, and achievement to other parties.</td></tr></table>	Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							1	2	3	4	5	6	7	Continuous Assessment	100%	✓	✓	✓	✓	✓	✓	✓	Total	100%								Specific Assessment Methods/Tasks	Remark	Continuous assessment	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. The student will be required to give a presentation and demonstration so that he/she can communicate the project design, methodology, and achievement to other parties.
Specific Assessment Methods/ Task	% Weighting			Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)																																			
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Specific Assessment Methods/Tasks	Remark																																						
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Student Study Effort Expected	Class contact (time-tabled):	
	Structured Study (regular meetings with supervisor)	78 Hours
	Other student study effort:	
	Guided Study/Reading/Experiment	90 Hours
	Reports	30 Hours
	Presentation and demonstration	12 Hours
	Total student study effort:	210 Hours
Reading List and References	Reference Books and Papers: <i>To be specified by the project supervisor for each project.</i>	
Last Updated	June 2015	
Prepared by	Dr. C.K. Leung	

Subject Description Form

Subject Code	EIE4435
Subject Title	Image and Audio Processing
Credit Value	3
Level	4
Pre-requisite	EIE3312 Linear Systems or EIE3103 Digital Signals and Systems
Co-requisite/ Exclusion	Nil
Objectives	To provide a broad treatment of the fundamentals in image and audio processing.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the fundamentals of image and audio signal processing and associated techniques. 2. Understand how to solve practical problems with some basic image and audio signal processing techniques. 3. Have the ability to design simple systems for realizing some multimedia applications with some basic image and audio signal processing techniques. <u>Category B: Attributes for all-roundedness</u> 4. Present ideas and findings effectively. 5. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Image processing</u> 1.1 Fundamentals of digital image: Digital image representation and visual perception, image sampling and quantization. 1.2 Image enhancement: Histogram processing; Median filtering; Low-pass filtering; High-pass filtering; Spatial filtering; Linear interpolation, Zooming. 1.3 Image coding and compression techniques: Scalar and vector quantizations; Codeword assignment; Entropy coding; Transform image coding; Wavelet coding; Codec examples. 1.4 Image analysis and segmentation: Feature extraction; Histogram; Edge detection; Thresholding. 1.5 Image representation and description: Boundary descriptor; Chaincode; Fourier descriptor; Skeletonizing; Texture descriptor; Moments. 2. <u>Audio processing</u> 2.1 Fundamentals of digital audio: Sampling; Dithering; Quantization; psychoacoustic model. 2.2 Basic digital audio processing techniques: Anti-aliasing filtering; Oversampling; Analog-to-digital conversion; Dithering; Noise shaping; Digital-to-analog Conversion; Equalisation. 2.3 Digital Audio compression: Critical bands; threshold of hearing; Amplitude masking; Temporal masking; Waveform coding; Perceptual coding; Coding techniques: Subband coding and Transform coding. 2.4 Case Study of Audio System/Codecs: MP3; MP3-Pro; CD; MD; DVD-Audio; AC-3; Dolby digital; Surround; SRS Surround system; Digital Audio Broadcasting, etc.

	Laboratory Experiments: 1. Image processing techniques 2. Image compression 3. Audio compression 4. Psychoacoustic behaviour							
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, 5	These are supplementary to lectures and are conducted with smaller class sizes; students will be able to clarify concepts and to gain a deeper understanding of the lecture material; problems and application examples are given and discussed.					
	Laboratory sessions	4, 5	Students will make use of software to simulate the various theories and visualize the results.					
Assessment Methods in Alignment with 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%					
	• Short quizzes		10%	✓	✓	✓		
	• Tests		16%	✓	✓	✓		
	• Laboratory sessions		14%	✓			✓	✓
	2. Examination		60%	✓	✓	✓	✓	✓
	Total		100 %					
	The continuous assessment will consist of a number of assignments, laboratory reports, and two tests.							

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/Tasks	Remark
	Short quizzes	These can measure the students' understanding of the theories and concepts as well as their comprehension of subject materials.
	Assignments, tests and examination	End-of chapter type problems are used to evaluate the students' ability in applying concepts and skills learnt in the classroom; students need to think critically and to learn independently in order to come up with an alternative solution to an existing problem.
	Laboratory sessions	Students are required to conduct some laboratory works, and produce the written reports; The accuracy and presentation of the report will be assessed; the emphasis is on assessing the students' ability to apply knowledge and skills learned in lectures, and their ability to relate the taken data and results to the most relevant theory.
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Textbooks: 1. R.C. Gonzalez and R.E. Woods, <i>Digital Image Processing</i>, 2nd ed., Prentice-Hall, 2002. 2. Ken C. Pohlmann, <i>Principles of Digital Audio</i>, 4th ed., McGraw-Hill, 2000. Reference Books: 1. Ze-Nian Li and Mark S. Drew, <i>Fundamentals of Multimedia</i>, Pearson Prentice-Hall, 2004. 2. M. Mandal, <i>Multimedia Signals and Systems</i>, Kluwer Academic Publishers, 2003.	
Last Updated	January 2018	
Prepared by	Dr Chris Chan	

Subject Description Form

Subject Code	EIE4449
Subject Title	Optical Communication Systems and Networks
Credit Value	3
Level	4
Exclusion	EIE581 Optical Wavelength Division Multiplexing Networks
Objectives	To provide students with the design and operating principles of modern optical communication systems and networks. Upon completion of the subject, students should be familiar with commonly used components and subsystems in optical communication and network systems and be able to design a simple optical communication link.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the basic operating principles of single mode and multimode fibres. 2. Understand the basic operating principles of light sources, detectors and amplifiers. 3. Understand the basic operating principles of passive optical devices. 4. Have the ability to design a simple optical communication link. 5. Appreciate the principles of optical communication networks. <u>Category B: Attributes for all-roundedness</u> 6. Present ideas and findings effectively. 7. Think critically. 8. Learn independently.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Optical Fibre</u> 1.1 Principles of optical waveguiding, single mode and multimode fibres and their transmission characteristics. 2. <u>Active and passive components</u> 2.1 Light emitting diodes (LEDs) and semiconductor lasers: operating principles and characteristics. Semiconductor optical detectors: PINs and APDs. Optical amplifiers: Erbium doped fibre amplifiers (EDFAs). 2.2 Coupler, isolator, circulator, wavelength division multiplexer and demultiplexer. 3. <u>Optical communication systems</u> 3.1 Transmission impairments: noise, dispersion, nonlinearity and crosstalk. Bit error rate (BER), Q factor and receiver sensitivity. 3.2 Point to point link design: power budget and power penalty. 3.3 Wavelength division multiplexing (WDM). Design of multi-span WDM links. 4. <u>Optical communication networks</u> 4.1 WDM add/drop multiplexer, WDM optical crossconnect, Basic architecture of a WDM optical network. Passive optical networks (PONs). Laboratory Experiments: Practical Works: 1. Optical fibre passive component measurement 2. Common fibre optic test and measurement techniques

Teaching/ Learning Methodology	<table border="1"> <tr> <th data-bbox="491 152 735 304">Teaching and Learning Method</th><th data-bbox="737 152 922 304">Intended Subject Learning Outcome</th><th data-bbox="924 152 1386 304">Remarks</th></tr> <tr> <td data-bbox="491 306 735 416">Lectures</td><td data-bbox="737 306 922 416">1,2,3,4,5</td><td data-bbox="924 306 1386 416">Fundamental principles and key concepts of the subject are delivered to students.</td></tr> <tr> <td data-bbox="491 418 735 645">Tutorials</td><td data-bbox="737 418 922 645">1,2,3,4,5,7,8</td><td data-bbox="924 418 1386 645">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; Assignments and application examples are given and discussed.</td></tr> <tr> <td data-bbox="491 647 735 909">Laboratory sessions</td><td data-bbox="737 647 922 909">1,2,3,6,7</td><td data-bbox="924 647 1386 909">Students will enhance their understanding of the concepts learnt through measuring the characteristics of various fibre components. Students are given the opportunity to analyze results obtained and to solve practical problem encountered.</td></tr> </table>	Teaching and Learning Method	Intended Subject Learning Outcome	Remarks	Lectures	1,2,3,4,5	Fundamental principles and key concepts of the subject are delivered to students.	Tutorials	1,2,3,4,5,7,8	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; Assignments and application examples are given and discussed.	Laboratory sessions	1,2,3,6,7	Students will enhance their understanding of the concepts learnt through measuring the characteristics of various fibre components. Students are given the opportunity to analyze results obtained and to solve practical problem encountered.																																																																		
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Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table border="1"> <tr> <th data-bbox="478 965 715 1117" rowspan="2">Specific Assessment Methods/Tasks</th><th data-bbox="716 965 895 1117" rowspan="2">% Weighting</th><th colspan="8" data-bbox="896 965 1388 1070">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th></tr> <tr> <th data-bbox="896 1072 954 1117">1</th><th data-bbox="956 1072 1013 1117">2</th><th data-bbox="1015 1072 1072 1117">3</th><th data-bbox="1074 1072 1131 1117">4</th><th data-bbox="1133 1072 1190 1117">5</th><th data-bbox="1192 1072 1249 1117">6</th><th data-bbox="1251 1072 1308 1117">7</th><th data-bbox="1310 1072 1388 1117">8</th></tr> <tr> <td data-bbox="478 1120 715 1229">1. Continuous Assessment (total 40%)</td><td data-bbox="716 1120 895 1229"></td><td data-bbox="896 1120 954 1229"></td><td data-bbox="956 1120 1013 1229"></td><td data-bbox="1015 1120 1072 1229"></td><td data-bbox="1074 1120 1131 1229"></td><td data-bbox="1133 1120 1190 1229"></td><td data-bbox="1192 1120 1249 1229"></td><td data-bbox="1251 1120 1308 1229"></td><td data-bbox="1310 1120 1388 1229"></td></tr> <tr> <td data-bbox="478 1232 715 1276">• Tests</td><td data-bbox="716 1232 895 1276">20%</td><td data-bbox="896 1232 954 1276">✓</td><td data-bbox="956 1232 1013 1276">✓</td><td data-bbox="1015 1232 1072 1276">✓</td><td data-bbox="1074 1232 1131 1276">✓</td><td data-bbox="1133 1232 1190 1276">✓</td><td data-bbox="1192 1232 1249 1276"></td><td data-bbox="1251 1232 1308 1276"></td><td data-bbox="1310 1232 1388 1276"></td></tr> <tr> <td data-bbox="478 1279 715 1323">• Assignments</td><td data-bbox="716 1279 895 1323">10%</td><td data-bbox="896 1279 954 1323">✓</td><td data-bbox="956 1279 1013 1323">✓</td><td data-bbox="1015 1279 1072 1323">✓</td><td data-bbox="1074 1279 1131 1323">✓</td><td data-bbox="1133 1279 1190 1323">✓</td><td data-bbox="1192 1279 1249 1323"></td><td data-bbox="1251 1279 1308 1323">✓</td><td data-bbox="1310 1279 1388 1323">✓</td></tr> <tr> <td data-bbox="478 1326 715 1404">• Laboratory sessions</td><td data-bbox="716 1326 895 1404">10%</td><td data-bbox="896 1326 954 1404">✓</td><td data-bbox="956 1326 1013 1404">✓</td><td data-bbox="1015 1326 1072 1404">✓</td><td data-bbox="1074 1326 1131 1404"></td><td data-bbox="1133 1326 1190 1404"></td><td data-bbox="1192 1326 1249 1404">✓</td><td data-bbox="1251 1326 1308 1404">✓</td><td data-bbox="1310 1326 1388 1404"></td></tr> <tr> <td data-bbox="478 1406 715 1451">2. Examination</td><td data-bbox="716 1406 895 1451">60%</td><td data-bbox="896 1406 954 1451">✓</td><td data-bbox="956 1406 1013 1451">✓</td><td data-bbox="1015 1406 1072 1451">✓</td><td data-bbox="1074 1406 1131 1451">✓</td><td data-bbox="1133 1406 1190 1451">✓</td><td data-bbox="1192 1406 1249 1451"></td><td data-bbox="1251 1406 1308 1451">✓</td><td data-bbox="1310 1406 1388 1451">✓</td></tr> <tr> <td data-bbox="478 1453 715 1498">Total</td><td data-bbox="716 1453 895 1498">100 %</td><td colspan="8" data-bbox="896 1453 1388 1498"></td></tr> </table> The continuous assessment consists of a number of assignments, laboratory reports and tests.	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%)										• Tests	20%	✓	✓	✓	✓	✓				• Assignments	10%	✓	✓	✓	✓	✓		✓	✓	• Laboratory sessions	10%	✓	✓	✓			✓	✓		2. Examination	60%	✓	✓	✓	✓	✓		✓	✓	Total	100 %								
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	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:	
	Specific Assessment Methods/Tasks	Remark
	Tests	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 and end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom
	Assignments 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. They need to find additional information independently in order to solve a given problem
	Laboratory sessions	Each group of students are required to produce a written report; Accuracy and the presentation of the report will be assessed.
Student Study Effort Expected	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Text Books: 1. G. Kaiser, <i>Optical Fiber Communications</i> , 5 th ed., McGraw-Hill, 2015. 2. John Senior, <i>Optical Fiber Communications: Principles and Practice</i> , 3 rd ed., Pearson Education, 2009. Reference Books: 1. Jeff Hecht, <i>Understanding Fiber Optics</i> , 4 th ed., Prentice-Hall, 2002.	
Last Updated	June 2015	
Prepared by	Prof. C. Lu	

Subject Description Form

Subject Code	ENG4001
Subject Title	Project Management
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with knowledge in: 1. Project management tools in business organizations, taking into account the time-cost relationships, resources, processes, risks, the project life cycle, organization, and management principles; 2. Project management methodologies and their application; 3. Choosing project variables for effective project management; and 4. Various developments of project management.
Intended Subject Learning Outcomes	Upon completion of the subject, students will be able to: 1. Demonstrate good understanding of definition of a project, the characteristics and project life cycle; 2. Identify appropriate project variables and practices that are applicable to engineering projects; 3. Perform project planning, cost/resources estimation, evaluate and monitor of project progress; and 4. Propose project management solutions, taking into consideration the project objectives and constraints.
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. <u>Project Overview, Management Principles, and the Systems Approach</u> Characteristics of projects and project management. Management principles. Project organization. Team development. Systems concepts and principles. Conflict management. 2. <u>Project Methodologies and Planning Techniques</u> Constraints: time, cost, and technical performance. Work breakdown structure. Management of scope. Scheduling tools: Gantt charts, network analysis techniques, time-phased networks, CPA, PERT, and resource smoothing. 3. <u>Cost Estimation and Cost Control for Projects</u> Types of estimates. Budgeting project costs. Experience curve. Cost schedules and forecasts. Cost control systems. 4. <u>Evaluation and Control of Projects</u> Earned value measurement system. Managing project risks. Status reporting. Project closeout and termination.
Teaching/Learning Methodology	A mixture of lectures, tutorial exercises, case studies, and laboratory work are used to deliver the various topics in this subject. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students' "learning to learn" ability. Some case studies are from best practices of projects, based on a literature review. They are used to integrate the topics and demonstrate to students how the various techniques are interrelated and applied in real-life situations.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed			
			1	2	3	4
	1. Tutorial exercises/ written report	20%		✓	✓	
	2. Mid Term Test	20%	✓	✓	✓	
	3. Written examination	60%	✓	✓	✓	✓
	Total	100%				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Continuous assessment (1) & (2): Test, written reports and tutorial exercises are used to assess students' understanding and application of the knowledge that they have learnt relative to learning outcomes (1), (2) and (3). Written examination: questions are designed to assess learning outcomes (1), (2), (3), and (4).					
Student Study Effort Expected	Class contact:					
	• Lectures	3 hours/week for 9 weeks				27 Hours
	• Tutorials / Case studies	3 hours/week for 4 weeks				12 Hours
	Other student study effort:					
	• Preparation for assignments, short tests, and the written examination					79 Hours
	Total student study effort:					118 Hours
Reading List and References	1. Meredith JR and Mantel SJ, 2010, <i>Project Management: a Managerial Approach</i> , Wiley, Hoboken NJ 2. Kerzner, H 2009, <i>Project Management: a Systems Approach to Planning, Scheduling, and Controlling</i> , John Wiley, New York 3. Smith, NJ (ed.) 2008, <i>Engineering Project Management</i> , Blackwell, Oxford					
Last Updated	July 2016					
Prepared by	Faculty of Engineering					

Different types of GPA, and their calculation methods

Types of GPA	Purpose	Rules for GPA calculation
GPA	Determine Progression/ Graduation	(1) All academic subjects taken by the student throughout his study, both inside and outside the programme curriculum, are included in the GPA calculation. (2) IC training subjects will be included in the GPA calculation while WIE/Sandwich Training will not. (3) For retake subjects, only the last attempt will be taken in the GPA calculation. (4) Level weighting, if any, will be ignored.
Semester GPA	Determine Progression	Similar to the rules for GPA as described above, except that only subjects taken in that Semester, including retaken subjects, will be included in the calculation.
Weighted GPA	To give an interim indication on the likely Award GPA	(1) Similar to the rules for GPA, except that only subjects inside the programme curriculum concerned will be included in the calculation. Subjects outside the programme curriculum will be excluded. (2) Only academic subjects will be counted towards the Weighted GPA. (3) For retake subjects, only the last attempt will be taken in the Weighted GPA calculation. (4) A weighting of 2 for Level 1 and 2 subjects, and a weighting of 3 for Level 3, 4 and 5 subjects, will be included in the calculation to determine the Honours classifications. (5) The weighted GPA will be the same as the Award GPA unless a student has taken more subjects than required.

Types of GPA	Purpose	Rules for GPA calculation
Major/Minor GPA	For reference and determination of award classification	<i>Major/Minor GPA</i> (1) Only subjects inside the curriculum of the Major/Minor Programmes will be taken in the Major/ Minor GPA calculation. (2) Only academic subjects will be counted towards the Major/Minor GPA. (3) For retake subjects, only the last attempt will be taken in the Major/Minor GPA calculation. (4) Up to 6 credits from the Major/GUR [including Language Communication Requirements (LCR) subjects at proficiency level] can be counted towards the chosen Minor. Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme. <i>Major GPA</i> (5) Level weighting will only be included in the calculation for weighted assessment scheme. <i>Minor GPA</i> (6) Level weighting will <u>not</u> be included in the calculation of Minor GPA.
Award GPA	For determination of award classification	If the student has not taken more subjects than required, the Award GPA will be as follows: (1) For programmes with level weightings: Award GPA = Weighted GPA (2) For Major/Minor programmes: Award GPA = Major GPA

University Graduation Requirements for 4-year Full-time Undergraduate Degree Programmes Offered from 2018/19 Onward

All candidates qualifying for a 4-year Full-time Undergraduate Degree offered from 2018/19 onward must meet:

1. the University Graduation Requirements, and
2. the specific graduation requirements of their chosen programme of study.

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

Summary of University Graduation Requirements for Normal Year 1 Intake

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

1. Complete successfully a minimum of 120 credits¹.
2. Earn a cumulative GPA of 2.00 or above at graduation.
3. Complete successfully the mandatory Work-Integrated Education (WIE) component as specified by their programme/Major.
4. Satisfy the following requirements in general education:

(a) Language and Communication Requirements ²	9 credits
(b) Freshman Seminar	3 credits
(c) Leadership and Intra-Personal Development	3 credits
(d) Service-Learning	3 credits
(e) Cluster Areas Requirement (CAR)	12 credits
(f) China Studies Requirement	(3 of the 12 CAR credits)
(g) Healthy Lifestyle ³	Non-credit bearing
Total = 30 credits	

Summary of University Graduation Requirements for Senior Year Intake

Area and Credit Requirement	Curriculum Requirement
Cluster-Area Requirements (CAR) [not more than 6 credits; min. 3 credits should be in subject designated as "China-related"]	• Students should not take more than 3 credits (normally 1 subject) from the same cluster area. • Students need to fulfill the English and Chinese reading and writing requirements and 3 credits of China Studies requirement (CSR). • Students may apply for a waiver if they have fulfilled the English and Chinese reading and writing requirements and/or CSR requirement in their previous studies.

¹ This minimum only applies to Normal Year 1 Intake. Also, for passing a subject which is designed to fulfil the credit requirement of different types of subject, students will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject itself will only be counted once in the student's total credit requirements, and the students will be required to make up the total credit requirement by taking another subject.

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

³ Students admitted to the programmes as Senior Year Intakes are not required to take the Healthy Lifestyle Programme. Advanced Standing students are required to take HLS (except for those who are HD/AD holders who follow the Senior Year/Articulation Degree programme GUR curriculum).

Area and Credit Requirement	Curriculum Requirement
Service Learning [3 credits]	-

No further credit transfer will be given to the required GUR unless the student is admitted on qualification more advanced than Associate Degree/Higher Diploma⁴ and had also completed comparable components in their earlier studies.

Regarding Language and Communication Requirements (LCR), this is normally not required. Only those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programmes and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement. The Programme offering department will refer to the guidelines provided by the Language Centres (ELC and CBS) to determine whether a new student has met the equivalent standard. Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements. However, this group of students would still be required to take one Chinese LCR subject to fulfil their Chinese LCR.

(a) Language and Communication Requirements (LCR)

English

All undergraduate students must successfully complete two 3-credit English language subjects as stipulated by the University, according to their English language proficiency level (**Table A**). These subjects are designed to suit students' different levels of English language proficiency at entry, as determined by their HKDSE score or the English Language Centre (ELC) entry assessment (when no HKDSE score is available, e.g. in the case of non-local students).

Students entering the University with specified attainment grades in certain public examinations can be given credit transfer or exemption for one or both LCR English subjects.

Table A: English LCR subjects (each 3 credits)

English language competence level/ Subject	<i>Practical English for University Studies</i>	<i>English for University Studies</i>	Any LCR Proficient level elective subject in English (Table B)
HKDSE Level 4 and above or equivalent	--	Subject 1	Subject 2
HKDSE Level 3 or equivalent	Subject 1	Subject 2	--

Table B: Proficient level elective subjects for DSE Level 4 students and above (or equivalent) (each 3 credits)

LCR Proficient level elective subjects	Advanced English for University Studies
	Advanced English Reading and Writing Skills
	English in Literature and Film
	Persuasive Communication

(The above framework will also apply to students on articulation degree programmes, Senior Year curriculum and Higher Diploma programmes, where applicable.)

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

Chinese

All undergraduate students are required to successfully complete one 3-credit Chinese language subject as stipulated by the University, according to their Chinese language proficiency level (**Table C**).

Table C: Chinese LCR subjects

Categories of students	Required subject
For Chinese speaking students	A Chinese LCR subject
For non-Chinese speakers or students whose Chinese standards are at junior secondary level or below	One subject from Table D below

Table D: Chinese LCR subjects for non-Chinese speakers or students whose Chinese standards are at junior secondary level or below

Subject (3 credits)	Pre-requisite/exclusion
Chinese I (for non-Chinese speaking students)	For non-Chinese speaking students at beginners' level
Chinese II (for non-Chinese speaking students)	- For non-Chinese speaking students; and - Students who have completed Chinese I or equivalent
Chinese III (for non-Chinese speaking students)	- For non-Chinese speaking students at higher competence levels; and - Students who have completed Chinese II or equivalent
Chinese IV (for Non-Chinese speaking students)	- For non-Chinese students at intermediate competence levels; and - Students who have completed Chinese III or equivalent
Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students)	For non-Chinese speaking students at higher competence levels

Students who have obtained verified qualifications or certain results in some public examinations [e.g. HKDSE, HKALE, JEE, GSAT(Taiwan)] should be granted exemption for the Chinese LCR subject. (Conditions for the exemption will be worked out in due course.)

(The above framework and exemption arrangements will also apply to students on articulation degree programmes, Senior Year curriculum and Higher Diploma programmes, where applicable.)

Writing Requirement in CAR Subjects

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

Reading Requirement in CAR Subjects

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

A list of approved CAR subjects for meeting the Writing Requirement (with a "W" designation) and for meeting the Reading Requirement (with an "R" designation) is shown at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

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

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

(b) Freshman Seminar

All students must successfully complete, normally in their first year of study, one 3-credit Freshman Seminar offered by their chosen Broad Discipline. The purpose is to (i) introduce students to their chosen discipline and enthuse them about their Major study, (ii) foster students' creativity, problem-solving ability and global outlook, (iii) give students an exposure to the concepts and an understanding of their discipline-based professional career development with the incorporation of entrepreneurship, and (iv) engage students, in their first year of study, in desirable forms of university learning that are conducive to smooth adjustment to University life, self-regulation, and autonomous learning.

A list of Freshman Seminars offered by the Broad Disciplines can be found at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

(c) Leadership and Intra-Personal Development

All students must successfully complete one 3-credit subject in the area of Leadership and Intra-Personal Development, which is designed to enable students to (i) understand and integrate theories, research and concepts on the qualities (particularly intra-personal and interpersonal qualities) of effective leaders in the Chinese context, (ii) develop greater self-awareness and a better understanding of oneself, (iii) acquire interpersonal skills essential for functioning as an effective leader, (iv) develop self-reflection skills in their learning, and (v) recognise the importance of the active pursuit of knowledge on an intra-personal and interpersonal level and its relationship to leadership qualities.

A list of designated subjects for meeting the leadership and intra-personal development requirement is available at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

(d) Service-Learning

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

These subjects may take the form of:

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

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

A list of designated subjects for meeting the service-learning requirement is available at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

(e) Cluster Areas Requirement (CAR)

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

- Human Nature, Relations and Development
- Community, Organisation and Globalisation
- History, Culture and World Views
- Science, Technology and Environment

A list of CAR subjects under each of the four Cluster Areas is available at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

(f) China Studies Requirement

Of the 12 credits of CAR described in (e) above, students are required to successfully complete a minimum of 3 credits on CAR subjects designated as "China-related". The purpose is to enable students to gain an increased understanding of China (e.g. its history, culture and society, as well as emerging issues or challenges).

A list of approved CAR subjects for meeting the China Studies Requirement is available at: <https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm>

(g) Healthy Lifestyle

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

With effect from the 2015/16 intake cohort, students will be required to complete the following components: (i) sports training/participation, (ii) e-learning modules, and (iii) lectures/talks. The syllabus covers physical health, mental health, social health, spiritual health, values and priorities on health behaviour with reference to competing priorities in life, reflection on healthy living and plans for self-improvement or maintenance of health behaviour. Details of the programme can be found at: <http://www.polyu.edu.hk/ogur/student/4yr/gur/hls/revised>

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

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