THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

HIGHER DIPLOMA

IN

INDUSTRIAL AND SYSTEMS ENGINEERING

Programme Code: 45386

PROGRAMME REQUIREMENT DOCUMENT

(For 2020/21 cohort)

September 2020

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SECTION 1 - GENERAL INFORMATION

Programme Title & Award	**Higher Diploma in Industrial and Systems Engineering**
Mode of Study	Full-time
Normal Duration	2 Years with a summer term
Total Credit Requirements for Graduation	Normally 60 credits* + 10 IC Training credits *exact number of credits depends on the academic background of students
Medium of Instruction	The programme is delivered in English version
Host Department	Department of Industrial and Systems Engineering (ISE)
Contributing Departments	AMA, AP, CLC, ELC, FENG, EIE, IC

This Programme Requirement Document 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.

SECTION 2 - OVERALL PROGRAMME AIMS AND INTENDED LEARNING OUTCOMES

2.1 UNIVERSITY MISSION

The design of this programme begins with the Mission Statement of the University stated below.

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.

2.2 RATIONALE AND PROGRAMME AIMS

Industrial and Systems Engineering concerns the design, improvement, and installation of integrated systems of people, materials, information, equipment, energy, and environment. This enables better understanding of the complex problems of modern industrial and business operations, and draws on specialized knowledge and skills in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems.

This programme provides students with integrated education at higher diploma level to enable them to develop into professionals in the industrial and systems engineering discipline. On completion of this programme, students are expected to:

1. be versed in the activities that persons employed in the various engineering disciplines may be called upon to fulfill in the execution of their duties, particularly, in the area of industrial and systems engineering;
2. have the knowledge and understanding needed to identify and solve industrial and systems engineering problems both as individuals and as members of teams;
3. have been exposed to a range of academic activities of such style and content as will enable them to develop effective communication skills (oral, written, graphical and numerate);
4. have been exposed to a range of activities that will enable them to seek, learn and apply information that is pertinent to the work they are undertaking.

2.3 RELATIONSHIP BETWEEN UNIVERSITY MISSIONS AND THE PROGRAMME AIMS

		UNIVERSITY MISSIONS		
		1	**2**	**3**
PROGRAMME AIMS	**1**	**X**	**X**	**X**
	2	**X**	**X**	
	3	**X**	**X**	**X**
	4	**X**	**X**	**X**

2.4 INTENDED LEARNING OUTCOMES (ILOs) OF THE PROGRAMME

The attributes of graduates produced by this programme, as listed below, are aligned with the programme aims specified in above.

1. To be versed in the activities of various engineering disciplines, and in particular, industrial and systems engineering so as to be able to appreciate and interact with other engineering professionals during execution of their duties.
2. To be able to apply knowledge, procedures (principles, techniques and methods), of engineering and, where appropriate, mathematics and science, to solve industrial and systems engineering problems, and to have sufficient understanding of their limitations so that they can select the most appropriate for a particular situation.
3. To have gained some experience and developed the ability in applying their knowledge to formulate problems, identify areas in organizations where improvements are necessary, and devise and implement strategies to produce solutions.
4. To be able to communicate (oral, written, graphical and numerate) effectively.
5. To be able to effectively work individually on their own initiative, and as members of a team.
6. To possess the ability to engage in life-long learning.

2.5 RELATIONSHIP BETWEEN AIMS AND INTENDED LEARNING OUTCOMES (ILOs) OF THE PROGRAMME

		ILOs OF THE PROGRAMME					
		1	**2**	**3**	**4**	**5**	**6**
PROGRAMME AIMS	**1**	**X**					
	2		**X**	**X**		**X**	
	3				**X**		
	4						**X**

2.6 INSTITUTIONAL LEARNING OUTCOMES

PolyU is committed to nurturing competent professionals who are also critical thinkers, effective communicators, innovative problem solvers, lifelong learners, ethical leaders and socially responsible global citizens. The institutional learning outcomes for these attributes are provided as follows:

1. **Competent professional**: Graduates should be able to integrate and to apply in-depth discipline knowledge and specialised skills that are fundamental to functioning effectively as an entry-level professional (professional competence); understand the global trends and opportunities related to their professions (global outlook); and demonstrate entrepreneurial spirit and skills in their work, including the discovery and use of opportunities, and experimentation and novel ideas (entrepreneurship).

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, where appropriate, orally and in writing, in professional and day-today contexts.

4. **Innovative problem solver**: Graduates should be able to identify and define problems in professional and daily contexts, and produce innovative solutions to the problems.

5. **Lifelong learner**: Graduates should be able to recognise the need for continual learning and self-improvement, and be able to plan, manage and evaluate their own learning in pursuit of self-determined development goals.

6. **Ethical leader**: Graduates should have an understanding of leadership and be prepared to serve as a leader and a team player (leadership and teamwork); demonstrate self-leadership and psychosocial competence in pursuing personal and professional development (intrapersonal competence); be capable of building and maintaining relationship and resolving conflicts in group work situations (interpersonal competence); demonstrate ethical reasoning in professional and day-to-day contexts (ethical reasoning).

7. **Socially responsible global citizen**: Graduates should have the capacity for understanding different cultures and social development needs in the local, national and global contexts (interest in culture and social development); and accept their responsibilities as professionals and citizens to society, their own nation and the world (social, national, and global responsibility).

2.7 RELATIONSHIP BETWEEN INTENDED LEARNING OUTCOMES (ILOs) OF THE PROGRAMME AND INSTITUTIONAL LEARNING OUTCOMES

		INSTITUTIONAL LEARNING OUTCOMES						
		1	**2**	**3**	**4**	**5**	**6**	**7**
ILOs OF THE PROGRAMME	**1**	**X**						
	2	**X**	**X**					
	3				**X**			
	4			**X**				
	5			**X**				
	6						**X**	**X**

2.8 CURRICULUM MAP THAT WE TEACH (T), GIVE STUDENTS PRACTICE (P) AND MEASURE (M) THE INTENDED LEARNING OUTCOMES (ILOs) OF THE PROGRAMME

SUBJECT CODES	SUBJECT TITLES	ILOs OF THE PROGRAMME					
		1	**2**	**3**	**4**	**5**	**6**
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics		TP				
AMA1120	Basic Mathematics II – Calculus and Linear Algebra		TP				
AMA2111	Mathematics I		TP				
AP10001	Introduction to Physics		TP				
AP10008	University Physics I		TP				
AP10009	University Physics II		TP				
CLC1105C/P	University Chinese for Higher Diploma Students				TP		

SUBJECT CODES	SUBJECT TITLES	ILOs OF THE PROGRAMME					
		1	2	3	4	5	6
EIE2302	Electricity and Electronics		TP				
ELC1007	University English for Higher Diploma Students I				TP		
ELC1008	University English for Higher Diploma Students II				TP		
ENG2001	Fundamentals of Materials Science and Engineering		TP				
ENG2003	Information Technology		TP			P	
ENG3003	Engineering Management	TP	TP			P	
IC2105	Engineering Communication and Fundamentals	TP	TP		TP		T
IC2170	Appreciation of Manufacturing Processes and Metrology	TP	TP		P	P	P
IC2122	Control and Automation	T	TP	TP			
IC2123	Design and Manufacturing Group Project	PM	PM	PM	PM	PM	PM
IC2127	Computer Proficiency Training	TP	TP		TP		
ISE246	Introduction to Logistics Engineering	TP	TP	TP	T	T	
ISE247	Fundamental of Enterprise Systems	T	TP	TP	P	P	
ISE318	Industrial Engineering Techniques and Methods	T	TPM	TP	P	P	P
ISE330	Product Safety and Reliability	T	T	P	P		T
ISE369	Quality Engineering	T	TP				
ISE3002	Planning of Production and Service Systems	TP	TP	TP	P		T
ISE3006	Materials and Processes Selection		TP		TP	P	

GUR subjects of cluster area requirement (CAR) not directly linked with the outcomes are not included.

2.9 FEEDBACK PROCESS

The Departmental Undergraduate Programme Committee and the Programme Leader are the elements of a feedback system in programme management. Their responsibilities include examining the information received from the stakeholders, modifying the plan as appropriate, using appropriate measurement data to evaluate the intended learning outcomes of the programme as the process is implemented, and suggesting changes in the subject content, the extracurricular content or any other revisions needed to improve the programme when its performance falls short of the benchmarks.

SECTION 3 - ADMISSION TO THE PROGRAMME

FREQUENCY OF ADMISSION AND REGISTRATION

3.1 Students are admitted into the programme on an annual basis into Semester 1 of the academic year.

MINIMUM ENTRANCE REQUIREMENTS

3.2 Candidates applying with Hong Kong Diploma Secondary Education (HKDSE) or equivalent.

Level 2 in 5 HKDSE subjects including English Language and Chinese Language

Preferred elective subjects for the programme include:

- English Language;
- Mathematics;
- Biology;
- Chemistry;
- Physics;
- Combined Science: Biology + Chemistry;
- Combined Science: Biology + Physics;
- Combined Science: Physics + Chemistry; and
- Information & Communication Technology.

Applicants can use not more than 2 Applied Learning (ApL) subjects in the application. The recognition of ApL subjects is as follows:

- "Attained with distinction" deemed equivalent to Level 3; and
- "Attained" deemed equivalent to Level 2.

The following Applied Learning Subjects are recognized for meeting the University entrance requirement and admission score calculation:

- Accounting in Practice;
- Applied Psychology;
- Automotive Technology;
- Aviation Studies;
- Business Data Analysis;
- Chinese in Business Service;
- Computer Forensic Technology;
- Computer Game and Animation Design;
- Creative Advertising;
- Electrical and Energy Engineering;
- Entrepreneurship for SME;
- Environment Eingineering;
- Health Care Practice;
- Interior Design;
- Internet of Everything Application;
- Jewellery and Accessories Design;
- Law Enforcement in Hong Kong;
- Marketing and Online Promotion;

- Marketing in Global Trade;
- Practical Psychology; and
- Purchasing and Merchandising.

3.3 Candidates applying with A-Level results with effect from the 2015/16 entry:

E in one A-Level subject or in two AS-Level subjects plus satisfying the English Language requirement

CANDIDATES APPLYING WITH A DIPLOMA FROM INSTITUTE OF VOCATIONAL EDUCATION

3.4 Holders of a Diploma in a relevant engineering discipline from The Hong Kong Polytechnic University or the Hong Kong Institute of Vocational Education (IVE) – or the former Technical Institutes (TI) or Hong Kong Polytechnic/Technical College may be admitted with subject exemption and credit transfer arrangements stated in Section 6.8 – 6.18 will apply.

CANDIDATES APPLYING UNDER EXCEPTIONAL CIRCUMSTANCES

3.5 Candidates who hold equivalent qualifications to those stated in 3.2 to 3.4 above are also eligible to apply for admission to the programme.

SELECTION PROCEDURE

3.6 The admission procedures will be coordinated by the Admissions Officer. Candidates applying with HKDSE or equivalent will be selected on the basis of their qualifications and academic achievement. Candidates applying without HKDSE or equivalent will be selected on the basis of academic achievement and by interview and/or admission test. However, preference may be given to industry sponsored candidates and those with relevant experience in industry.

SECTION 4 - CURRICULUM STRUCTURE

4.1 The curriculum structure is shown on the progression pattern on page 4-4 to 4-6.

GENERAL UNIVERSITY REQUIREMENTS FOR HIGHER DIPLOMA PROGRAMME (HDGUR)

4.2 Students are required to complete 15 credits of HDGUR subjects which are language and communications requirements, cluster areas requirement and China studies requirement. It is further explained in Appendix I.

COMPULSORY AND ELECTIVE SUBJECTS

4.3 The programme has been planned with the primary aim of producing either ISE graduates capable of fulfilling what we visualise as being their duties on employment and, in large measure, the curriculum content has been designed to enable them to discharge this obligation. Since ISE is a very broad discipline, most of the subjects in the curriculum are compulsory and they provide a balance of subjects devoted to design, technology and management oriented subjects. This, to some extent restricts the scope for flexibility of students to pursue subject of their own particular interest yet still being retained under the broad spectrum of ISE. However, some choice has been made available by including a number of elective subjects at Level 2 and 3. Accordingly, students are able to select two electives from a pool of six. These will normally be taken during Semester 1 or 2 of Year 2.

INDUSTRIAL CENTRE BASED TRAINING

4.4 This is of 8 weeks duration and is undertaken in the University's Industrial Centre. The first 4 weeks compose of Engineering Drawing & CAD, Basic Scientific Computing, Basic Mechatronics Practices and Industrial Safety and are taken during the semester 1 & 2 of Year 1 and the summer term between Year 1 & 2. It is followed by 4 weeks of integrated practical training, the Appreciation of Manufacturing Technologies, and is taken during the summer term between Year 1 and 2.

A variety of objectives are fulfilled by this training experience and these are listed below. However, all of these are but facets of one over-riding aim to create, within the time limitations, an environment of learning by doing under a holistic approach. Objectives of these training periods are:

(i) to develop in the students "industrial safety consciousness" to familiarise them with safe work practices, acquaint them with the hazards of various engineering activities, and to develop a sense of responsibility for the safety of themselves and others;

(ii) to develop the students' ability to produce and interpret engineering drawings and specifications, and to give them an understanding of the importance of CAD/engineering documentation;

(iii) to give the students a broad acquaintance with and a grasp of ISE practices in engineering (and other) industries;

(iv) to enable the students to appreciate the skills associated with processing of materials; in addition, to afford them an opportunity to appreciate, in a rudimentary manner, the extent to which good design can facilitate production and assembly in manufacturing industries;

(v) to enable the students to gain a holistic understanding of the selection of materials, production processes, typical mechatronics systems and design considerations of manufactured products and the complex interaction between them.

4.5 During the Industrial Centre based training period, students undertake specific subjects in the following areas in order to achieve the above mentioned objectives.

(i) Engineering Communication and Fundamentals (IC2105) (during the semester 1 & 2 of Year 1 and the summer term between Year 1 & 2);

(ii) Appreciation of Manufacturing Processes and Metrology (IC2170) (during the summer term between Year 1 and 2).

Detail training subject descriptions of (i) and (ii) can be found in Section 9 – IC Training Subjects and Modules.

4.6 The list is not exhaustive and other subjects/modules may be developed to replace or supplement those listed. Such alternations are on-going and will be made in conjunction with the Departmental Programme Committee's assessment of current needs in conjunction with the Industrial Centre.

IT AND MULTI-MEDIA TRAINING

4.7 This training subject (IC2127) has the specific aim of ensuring an adequate level of proficiency in practical computer skills applicable to students' academic studies and in their later professional lives. Students will focus on using particular software packages. Using a "hands-on" approach, the Course provides students with the opportunity to explore the basic concepts at the user level and to experience the software packages first hand.

4.8 Specifically, the modules in the training subject are:

(i) Project Planning and Business Documentation (TM3006);

(ii) Basic Computer-aided Statistical Analysis (TM3015).
Detail training subject descriptions of (i) and (ii) can be found in Section 9 – IC Training Subjects and Modules.

DESIGN AND MANUFACTURING GROUP PROJECT

4.9 *Design and Manufacturing Group Project (IC2123)* is carried out in the final year of the programme. All projects assigned will be of 'real' work basis proposed by supervisors. Typical projects are product for a specific application, innovative transportation device, material handling systems, testing jig and fixture…etc. These projects are always having a real problem of serious interest to the clients which requires students to meet the expected demand.
Students are required to work through the various project stages step by step starting from problem identification, engineering design, material procurement, costing, manufacturing onwards up to assembly, testing and evaluation.

Throughout the duration of the project, the supervisor provides guidance and monitors the progress of the projects. The project-based learning approach is recommended for adoption. It is a systematic teaching method engaging students to learn the essential knowledge and life-enhancing skills through extended and student-influenced inquiry process, which are structured around complex and real problems.

(i) The project is a detailed study of various aspects related to the students' field of study. Normally, students work in groups of three to four members. They have to apply all the knowledge learned through group projects or by self-learning.

(ii) Throughout the project duration, project supervisors are expected to discuss with their students through meetings, which can be arranged based on mutually convenient schedules. The supervisors shall provide guidance and monitor the progress of the projects.

4.10 While the specific objectives of individual projects may vary from one project to another, students are expected to develop the following generic skills through the learning experience of working on an individual project under the guidance of a supervisor:

(i) Skills to obtain the required information to formulate a problem, and to devise and implement strategies in order to produce a solution;

(ii) Skills to apply knowledge and procedures (principles, techniques, and methods) and to understand their limitations in problem identification, data analysis, and formulation of logical observations and/or solutions;

(iii) Skills to work effectively as an individual using one's initiative and within constraints;

(iv) Skills to prepare, present, and defend a project report effectively.

PROGRESSION PATTERN OF THE CURRICULUM – HD ISE

1. For students who <u>have</u> Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics), or the equivalent qualifications.

(Total Credits Required for Graduation: 60 credits and 10 IC training credits)

Year 1 (30 credits & 4 IC training credits)			
Semester 1 (15 credits)		**Semester 2 (15 credits)**	
English I (LCR I)#	3	English II (LCR II)#	3
CAR I#	3	Fundamentals of Materials Science and Engineering (ENG2001)	3
Basic Mathematics I – Calculus and Probability and Statistics (AMA1110)	3	Basic Mathematics II – Calculus and Linear Algebra (AMA1120)	3
Information Technology (ENG2003)	3	Chinese Communication# (LCR III)	3
University Physics I (AP10008)	3	University Physics II (AP10009)	3
Engineering Communication and Fundamentals (IC2105)	2 IC training credits	Engineering Communication and Fundamentals (IC2105) – cont'd	2 IC training credits

Summer Term (6 IC training credits)	
Appreciation of Manufacturing Processes and Metrology (IC2170)	4 IC training credits
Computer Proficiency Training (IC2127)	2 IC training credits

CARs may be offered in summer term, subject to the subject offering department.

Year 2 (30 credits)			
Semester 1 (15 credits)		**Semester 2 (15 credits)**	
Mathematics I (AMA2111)	3	Industrial Engineering Techniques and Methods (ISE318)	3
Control and Automation (IC2122)	3	CAR II#	3
Quality Engineering (ISE369)	3	Electricity and Electronic (EIE2302)	3
Elective 1*	3	Elective 2*	3
Design and Manufacturing Group Project (IC2123)	3	Design and Manufacturing Group Project (IC2123) – cont'd	3

2. For students who do not have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics), or the equivalent qualifications.

(Total Credits Required for Graduation: 63 credits and 10 IC training credits)

Year 1 (30 credits & 4 IC training credits)			
Semester 1 (15 credits)		**Semester 2 (15 credits)**	
English I (LCR I)#	3	English II (LCR II)#	3
CAR I#	3	Chinese Communication# (LCR III)	3
Basic Mathematics I – Calculus and Probability and Statistics (AMA1110)	3	Basic Mathematics II – Calculus and Linear Algebra (AMA1120)	3
Information Technology (ENG2003)	3	Fundamentals of Materials Science and Engineering (ENG2001)	3
Introduction to Physics (AP10001)	3	University Physics I (AP10008)	3
Engineering Communication and Fundamentals (IC2105)	2 IC training credits	Engineering Communication and Fundamentals (IC2105) – cont'd	2 IC training credits

Summer Term (6 IC training credits)	
Appreciation of Manufacturing Processes and Metrology (IC2170)	4 IC training credits
Computer Proficiency Training (IC2127)	2 IC training credits

CARs may be offered in summer term, subject to the subject offering department.

Year 2 (33 credits)			
Semester 1 (18 credits)		**Semester 2 (15 credits)**	
Mathematics I (AMA2111)	3	Industrial Engineering Techniques and Methods (ISE318)	3
Control and Automation (IC2122)	3	CAR II#	3
Quality Engineering (ISE369)	3	Electricity and Electronic (EIE2302)	3
University Physics II (AP10009)	3	-	-
Elective 1*	3	Elective 2*	3
Design and Manufacturing Group Project (IC2123)	3	Design and Manufacturing Group Project (IC2123) – cont'd	3

This table applied to all of the above study patterns

*Electives	Select **TWO** from the following subjects	
	• Introduction to Logistics Engineering (ISE246) • Planning of Production and Service Systems (ISE3002) • Materials and Processes Selection (ISE3006)	• Fundamental of Enterprise Systems (ISE247) • Product Safety and Reliability (ISE330) • Engineering Management (ENG3003)

General University Requirements (GUR) The pattern for GUR subjects are indicative only. Students may take these subjects according to their own schedule.

SECTION 5 - EXAMINATION AND ASSESSMENT

GENERAL ASSESSMENT REGULATIONS (GAR)

5.1 The University's General Assessment Regulations shall apply to the programme. The specific assessment regulations are set out here, having been developed within the framework of the GAR.

ASSESSMENT METHODS

5.2 Students' performance in a subject can be assessed by continuous assessment and/or examinations, at the discretion of the individual subject offering Department. Where both continuous assessment and examinations are used, the weighting of each in the overall subject grade is clearly stated in Section 8 of this document. The subject offering Department can decide whether students are required to pass both the continuous assessment and examination components, or either components only, in order to obtain a subject pass, but this requirement (to pass both, or either, components) will be specified in Section 8 of this document. Learning outcome should be assessed by continuous assessment and/or examination appropriately, in line with the outcome-based approach.

5.3 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.

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

GRADING

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

Subject grade	***Grade point***	***Short description***	***Elaboration on subject grading description***
A+ A A-	4.3 4.0 3.7	Excellent	Demonstrates excellent achievement of intended subject learning outcomes by being able to skillfully use concepts and solve complex problems. Shows evidence of innovative and critical thinking in unfamiliar situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.
B+ B B-	3.3 3.0 2.7	Good	Demonstrates good achievement of intended subject learning outcomes by being able to use appropriate concepts and solve problems. Shows the ability to analyse issues critically and make well-grounded judgements in familiar or standard situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.

C+ C C-	2.3 2.0 1.7	Satisfactory	Demonstrates satisfactory achievement of intended subject learning outcomes by being able to solve relatively simple problems. Shows some capacity for analysis and making judgements in a variety of familiar and standard situations, and is able to express the synthesis or application of ideas in a manner that is generally logical but fragmented.
D+ D	1.3 1.0	Pass	Demonstrates marginal achievement of intended subject learning outcomes by being able to solve relatively simple problems. Can make basic comparisons, connections and judgments and express the ideas learnt in the subject, though there are frequent breakdowns in logic and clarity.
F	0.0	Fail	Demonstrates inadequate achievement of intended subject learning outcomes through a lack of knowledge and/or understanding of the subject matter. Evidence of analysis is often irrelevant or incomplete.

'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.

Indicative descriptors for modifier grades

Main Grade (solid)	The student generally performed at this level, indicating mastery of the subject intended learning outcomes at this level.
+ (exemplary)	The student consistently performed at this level and exceeded the expectations of this level in some regards, but not enough to claim mastery at the next level.
- (marginal)	The student basically performed at this level, but the performance was inconsistent or fell slightly short in some regards.

Note: The above indicative descriptors for modifier grades are not applicable to the pass grades D and D+

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

$$\text{GPA} = \left[\frac{\sum_n \text{Subject Grade Point} \times \text{Subject Credit Value}}{\sum_n \text{Subject Credit Value}} \right]$$

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

5.7 Exempted, ungraded and incomplete subjects, subjects for which credit transfer has been approved without any grade assigned^, and subjects from which a student has been allowed to withdraw, i.e. those with the Grade "W" will be excluded from the GPA calculation. Subjects which have been given an "S" grade code i.e. absent from all assessment components, will be included in the GPA calculation and will be counted as "zero" grade point. The 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 ranges from 0.00 to 4.30 from 2020/21.

^ 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.

DIFFERENT TYPES OF GPA

5.8 GPA 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.

5.9 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.

5.10 Along with the 'cumulative' GPA, a weighted GPA will also be calculated, to give an indication to the Board of Examiners on the award classification which a student will likely get if he makes steady progress on his/her academic studies. GUR subjects will be included in the calculation of weighted GPA for all programmes.

5.11 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.

ASSESSMENT OF INDUSTRIAL CENTRE TRAINING

5.12 An assessment panel (Industrial Centre Training) assesses the performance of students during the IC training period.

5.13 Industrial Centre Training is given a training credit value equivalent to one credit for each week spent on such training, this being equivalent to about 35 hours of study (including hours spent on private study). Accordingly, a 10-week equivalent of industrial training generates a total of 10 training credits. The typical schedule of IC Training is as follows:

Subject Description	Duration & Semester
1. Engineering Communication and Fundamentals (IC2105) (4 credits)	4 weeks, during Semester 1 & 2 of Year 1 and the summer term between Year 1 & 2
2. Computer Proficiency Training (IC2127) (2 credits)	2 weeks, during the summer term between Year 1 & 2
3. Appreciation of Manufacturing Technologies (IC2107) (4 credits)	4 weeks, during the summer term between Year 1 & 2

Subject 1 will be graded at the time when an assessment is made. Only **ONE** aggregate grade is given to sum up the performance of the student in this subject at the end of the summer term between Year 1 & 2.
Assessment for Subject 2 and 3 are made at the end of summer term between Year 1 and 2.

IT AND MULTI-MEDIA TRAINING

5.14 Subject 2 is a 2-week training taken during Semester 1 & 2 of Year 1. The selected module is listed in 4.8 above:

5.15 Subject 2 will be graded at the time when an assessment is made. Only **ONE** aggregate grade is given to sum up the performance of the student in this subject at the end of semester 2.

5.16 Credits earned from all IC training (5.12 above) are:

(i) not counted towards the Weighted GPA/Award GPA calculation which is used for considering the award classification;

(ii) not counted towards the number of credits needed for meeting the requirement of the award(s) but students must obtain a minimum Grade D to qualify for an award;

(iii) not counted for meeting the credit requirement for full-time status of students;

(iv) taken into account in the GPA calculation, which is computed at the end of every semester on the basis of a student's performance on all subjects taken since the start of their studies.

ASSESSMENT OF DESIGN AND MANUFACTURING GROUP PROJECT

5.17 Throughout the duration of the project, the supervisor provides guidance and monitors the progress of the projects. The assessment criteria are:

(i) Project Performance is to assess how well the deliverable of the project meets with client's requirement in terms of completeness, functionality, and accuracy.

(ii) Oral Presentation allows students to demonstrate their ability in presenting their project clearly and logically including the project objectives, their approach to solve the problem and the deliverable of their project.

(iii) Written Report is to facilitate students to review and sum up the activities and processes of the project holistically. Assessment of the report will focus on the adequacy of the technical content, clarity and fluency of the presentation, discussion, comment and recommendation.

5.18 The second and the third components are jointly assessed by two co-examiners and the project supervisor. In each single one of the assessment method above, there will be consisted of both "group work" and "individual work" to reflect the student's performance.

PROGRESSION/ACADEMIC PROBATION/DEREGISTRATION

5.19 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 de-registered from the programme.

When a student has a Grade Point Average (GPA) lower than 1.70, he/she will be put on academic probation in the following semester. Once when a student is able to pull his/her GPA

up to 1.70 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in transcript of studies.

5.20 A student will have 'progressing' status unless he/she falls within any one of the following categories which may be regarded as grounds for de-registration from the programme:

(i) the student has reached the final year of the normal period of registration for that programme, as specified in this document, unless approval has been given for extension; or

(ii) the student has reached the maximum number of retakes allowed for a failed compulsory subject; or

(iii) the student's GPA is lower than 1.70 for two consecutive semesters and his/her Semester GPA in the second semester is also lower than 1.70; or

(iv) the student's GPA is lower than 1.70 for three consecutive semesters.

When a student falls within any of the categories as stipulated above, except for category (i) with approval for extension, the Board of Examiners shall de-register the student from the programme without exception.

A student may be deregistered from the programme enrolled before the time frame specified in (ii) or (iii) above if his/her academic performance is poor to the extent that the Board of Examiners considers that there is not much of chance for him/her to attain a GPA of 1.70 at the end of the programme.

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

UNIVERSITY GRADUATION REQUIREMENTS

5.21 A student is eligible for award if he/she satisfies all the conditions listed below:

(i) Complete successfully an accumulation of 60 credits[#] + 10 IC training credits for the award;

(ii) Earn a cumulative GPA of 1.70 or above at graduation;

(iii) Satisfy 15 credits General University Requirements for Higher Diploma programme (HDGUR);

(a) HD Language and Communication Requirements (HDLCR) [9 credits: 6 credits in English and 3 credits in Chinese]	9 credits
(b) Cluster Areas Requirement (CAR) [6 credits: 3 credits should be in subjects designed as "China-related"]	6 credits
Total =	**15 credits**

[#] This minimum only applies to students who are admitted through the normal route.

(iv) Satisfy the residential requirement for at least 1/3 of the credits to be completed for the award he/she is currently enrolled in PolyU; and

(v) Satisfy any other requirements as specified in this document and as specified by the University.

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

5.23 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.

5.24 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.

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

5.26 A student is required to graduate as soon as he/she satisfies the graduation requirements as stipulated in 5.21 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.

GUIDELINES FOR AWARD CLASSIFICATION

5.27 To help the Board of Examiners in arriving at award classification decisions, a weighted GPA will be computed for each student upon completion of the programme. The Weighted GPA will be computed as follows:

$$\text{Weighted GPA} = \left[\frac{\sum_n \text{Subject Grade Point} \times \text{Subject Credit Value} \times W_i}{\sum_n \text{Subject Credit Value} \times W_i} \right]$$

where Wi = weighting of between 0 and 1, to be assigned according to the level of the subject

n = number of all subjects counted in GPA calculation as set out in paragraph 5.6, except those exclusions that any subjects passed after the graduation requirement has been met will not be taken into account of in the grade point calculation for award classification.

The weighting of each level is a measure of the relevance of the level to the classification of the award. A weighting of 2 for Level 1 and 2 subjects, and a weighting of 3 for Level 3 and 4

subjects, will be included in the calculation to determine the classifications of the award. Same as GPA, weighted GPA ranges from 0.00 to 4.30 from 2020/21.

5.28 The contribution of each subject towards the weighted GPA depends on the product of the credits assigned and the level weighting. The weighted GPA will be used as one of the factors to be considered by the Board of Examiners in the determination of the award classifications.

5.29 Any subjects passed after the graduation requirement has been met will not be taken into account of in the grade point calculation for award classification. However, if a student attempts more elective subjects (or optional subjects) than those required for graduation in or before the semester in which he/she becomes eligible for award, the elective subjects (or optional subjects) with a higher grade/contribution shall be included in the grade point calculation (i.e. the excessive subjects attempted with a lower grade/contribution, including failed subjects, will be excluded except for students who have indicated inclusion of specific free electives for fulfilment of award requirements).

CLASSIFICATION OF AWARDS

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

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

5.31 Students who have committed academic dishonesty or non-compliance with examination regulations will be subject to the penalty of the lowering of award classification by one level. 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.

5.32 The following are the award GPA ranges for determining award classifications:

Award Classification	Award GPA
Distinction	3.60 to 4.30
Credit	3.00 to 3.59
Pass	1.70 to 2.99

5.33 Decisions by the Boards of Examiners on award classifications to be granted to each student on completion of the programme shall be ratified by the Faculty Board (of Examiners). For cases the decisions of which do not conform to the above indicative GPA range, they should be referred, by the Faculty Board (of Examiners), to the APRC for ratification.

VALIDITY OF CREDITS

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

RETAKING OF SUBJECTS

5.35 Students may only retake a subject which they have failed (i.e. Grade F or U). Retaking of subjects is with the condition that the maximum study load of 21 credits per semester is not exceeded. The number of retakes of a subject should be restricted to two, i.e. a maximum of three attempts for each subject is allowed.

5.36 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 need to 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; 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.

5.37 Students need to submit a request to the Faculty Board for the second retake of a failed subject.

5.38 Students who have failed a compulsory subject after two retakes and have been de-registered can submit an appeal to the Academic Appeals Committee (AAC) for a third chance of retaking the subject.

5.39 In relation to 5.38 above, in case AAC does not approve further retaking of a failed compulsory subject or the taking of an equivalent subject with special approval from the Faculty, the student concerned would be de-registered and the decision of the AAC shall be final within the University.

ABSENCE FROM AN ASSESSMENT COMPONENT

5.40 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 normally 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 Board Chairman shall decide on an appropriate time for completion of the late assessment.

5.41 The student concerned is required to submit his/her application for late assessment in writing to the Head of Department offering the subject, with 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

5.42 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

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

5.44 A student who has been offered an aegrotat award shall have the right to choose either to accept such an award or request to be assessed on another occasion as stipulated by the Board of Examiners, the student's exercise of this option shall be irrevocable. The acceptance of an aegrotat award by a student shall disqualify him/her from any subsequent assessment for the same award. An aegrotat award shall normally not be classified, and the award parchment shall not state that it is an aegrotat award. However, the Board of Examiners may determine whether the award should be classified provided they have adequate information on the students' academic performance.

OTHER PARTICULAR CIRCUMSTANCES

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

RECORDING OF DISCIPLINARY ACTIONS IN STUDENTS' RECORDS

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

5.47 Students who are found guilty of academic dishonesty or non-compliance with examination regulations 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/ non-compliance with examination regulations'. 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.

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

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

SECTION 6 - PROGRAMME OPERATION AND CONTROL

FREQUENCY OF SUBJECTS TO BE OFFERED

6.1 Subjects are normally offered once a year. There are however, several common subjects shared by other programmes in the PolyU which may be available in both Semester's 1 and 2. Subject to the availability of resources, the Department will attempt to offer as many subjects as possible in both semesters.

DAYTIME, EVENING AND SUMMER TEACHING

6.2 Most of the subjects listed in the programme will be offered in the daytime and evening. Usually, there will be no summer term teaching (with the exception of IC training at the Industrial Centre or LCR/CAR subjects), subjects will only be offered in Semester's 1 and 2.

SUBJECT REGISTRATION AND WITHDRAWAL

6.3 In addition to programme registration, students need to register for the subjects at specified periods prior to the commencement of the 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 Programme Leader concerned. Application submitted after the commencement of the examination period will not be considered. For approved applications of subject withdrawal, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the examination result notification and transcript of studies but will not be counted towards the calculation of GPA.

STUDY LOAD

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

6.5 The normal study load is 15 credits in a semester for full-time study. The maximum study load to be taken by a student in a semester is 21 credits, unless exceptional approval is given by the Head of the programme offering Department. For such cases, students should be reminded that the study load approved should not be taken as grounds for academic appeal.

6.6 To help improve the academic performance of students on academic probation, these students will be required to take a reduced study load in the following semester (Summer Term excluded). The maximum number of credits to be taken by the students varies according to the policies of individual Departments and will be subject to the approval of the authorities concerned.

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

SUBJECT EXEMPTION

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

CREDIT TRANSFER

6.9 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 not normally counted towards more than one award. The granting of credit transfer is a matter of academic judgment.

6.10 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 which are submitted by students who have completed an approved student exchange programme, the decision will be made by the programme offering Department in consultation with the subject offering Departments.

6.11 The validity period of credits previously earned is up to 8 years after the year of attainment.

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

6.13 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 the admission stage will be counted towards the maximum limit for credit transfer when students apply for further credit transfer after their admission.

6.14 Credit transfer can be applicable to credits earned by students through study at an overseas institution under an approved exchange programme. Students should, before they go abroad for the exchange programme, seek prior approval from the programme offering Department (who will consult the subject offering Departments as appropriate) on their study plan and credit transferability.

6.15 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.

6.16 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 should make reference to the mapping lists of GUR subjects, compiled by the Committee on General University Requirements (CoGUR), on the eligibility of the subjects which can qualify 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.

6.17 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.

6.18 Students should 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.

DEFERMENT OF STUDY

6.19 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 is required. The deferment period will not count towards total period of registration.

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

6.21 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.

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

NORMAL DURATION FOR COMPLETION OF THE PROGRAMME

6.23 Students should complete the programme within the normal duration of the programme as specified in the Programme Requirement Document. Those who exceed the normal duration of the programme will be de-registered from the programme unless prior approval has been obtained from relevant authorities. The study period of a student shall exclude deferment granted for justifiable reasons, and the semester(s) when the student has been approved to undertake internship. Any semester in which the students are allowed to take zero subject will be counted towards their total period of registration.

6.24 Students who have been registered for the normal duration of the programme may request extension of their studies for up to one year with the approval of the relevant Heads of Department. Applications for extension of study period beyond one year and up to two years will require the approval from Faculty Board Chairman.

6.25 Students who have exceeded the normal duration of the programme for more than two years and have been de-registered can submit an appeal to the Academic Appeals Committee to request further extension. If the appeal fails, the student shall be de-registered.

DEPARTMENTAL UNDERGRADUATE PROGRAMME COMMITTEE

6.26 The Head of Department can decide on the composition of the Departmental Undergraduate Programme Committee. The Departmental Undergraduate Programme Committee will meet at least twice a year, and additionally at the request of the Chairman or of one-third of its membership or of the Chairman of the Senate. It will exercise the overall academic and operational responsibility for the programme and its development within defined policies, procedures and regulations.

The Committee will be specifically responsible for the following:

(i) the effective conduct, organisation and development of the programme;

(ii) stimulation of the development of teaching methods and programme materials, through Heads of Departments, Theme Group Leaders, and the Educational Development Centre, as appropriate;

(iii) review of academic regulations, admission policy, assessment and examination methods;

(iv) formal submissions to appropriate professional bodies, normally via the Head of the host Department and in accord with the University's established procedures;

(v) the continuing critical review of the rationale, aims, intended learning outcomes (ILOs) and the alignment of teaching, learning and assessment with the ILOs, programme learning outcomes assessment and its results, and the improvement and development of the programme(s);

(vi) definition and maintenance of the programme's academic standard;

(vii) ensuring that the views of students and other key stakeholders on the programme are known and taken into account;

(viii) evaluation of the operation, health and progress of the programme as defined in the University's programme review procedures.

PROGRAMME LEADER

6.27 A Programme Leader will normally be a member of the programme offering Department and be appointed by the Head of Department. The appointment will be subject to the confirmation by the Chairman of the appropriate Faculty Board. In the unavoidable absence of a Programme Leader, an acting Programme Leader will be appointed by the Head of the programme offering Department. A Programme Leader is accountable in day-to-day operational terms to the Head of Department; and will normally hold office for a full cycle of the programme, but can then be considered for re-nomination. The Programme Leader will provide the academic and organizational leadership for the programme.

PROGRAMME EXECUTIVE GROUP

6.28 For programmes which are substantial, e.g. in scale, in the range of subjects or complexity, a small Programme Executive Group, would normally manage the day-to-day operation of the programme within the agreed scheme. The Group would operate informally, be organized by the Programme Leader and typically include staff with key programme responsibilities. For relatively simple programmes, the Programme Leaders would manage the day-to-day operation of the programmes.

THEME GROUP LEADERS

6.29 Theme Group Leaders are senior members of academic staff appointed by the Head of Department. They are responsible for the activities and development of subjects within a theme group which are part of the curricula of the programmes offered by the Department.

ACADEMIC ADVISOR

6.30 All full-time undergraduate students (including those admitted to Articulation Programmes or Senior Year Places) will be assigned to one full-time academic staff (normally at the Lecturer grade or above) from his/her Major Department who will act as his/her academic advisor throughout his/her course of study at PolyU.

6.31 The main responsibilities of the academic advisor will include:

- Building rapport with the student, serving as a bridge that connects them to the Department,
- Being accessible and available to students, and responding to their questions and concerns,
- Helping students to consider and clarify their intellectual, professional and personal goals,
- Helping students to develop an appropriate study plan (particular with regard to their Major), and assisting in their selection of appropriate courses to achieve their identified goals,
- Clarifying to students academic regulations and requirements, particularly those relating to the Major,
- Identifying students with special learning needs or early signs of learning problem, and referring/encouraging them to seek help or support.

6.32 Academic advisors are expected to keep in contact with their student advisees regularly (e.g., via emails or other means), and to have at least one face-to-face meeting with them, either individual or in small groups, during the academic year. Student advisees are expected to consult their respective advisors on their study plan before subject registration.

6.33 Effective academic advising requires an active participation of student advisees in the processes. It is important that students understand it is their responsibilities to:

- Understand the academic regulations and requirements of their chosen programme of study and/or its Major, as well as the GUR requirements,
- Actively obtain information, and seek out advisors and resources on a regular basis and as needed,
- Take the final responsibility for making decisions and choices regarding their academic study based on the information and advice given.

STUDENT/STAFF CONSULTATIVE GROUP

6.34 The importance of assessing students' opinion on the organisation and running of the programme on a continual basis is recognised and formal arrangements for this purpose are in

place. The Group should have equal numbers of students and staff, that student membership should include all years of study under the normal progression pattern and other major student groupings, and that staff membership should cover all the main subject areas and activities of the programme. A member of staff may chair the Group. The Group is to discuss any matters directly related to the programme, and to report or make recommendations, as deemed necessary, to the Departmental Undergraduate Programme Committee. Meetings are usually held once per semester.

6.35 It is important that students do not perceive meetings of the Group as the only or main channel for dealing with student problems and complaints accumulated since the last meeting. Such matters would be dealt with when they occurred, through the Programme Leader or other appropriate staff. This would allow meetings of the Group to be used for constructive discussion of the programme in general, of the demands of the programme on students, and of possible improvement.

SECTION 7 - PROGRAMME EVALUATION AND DEVELOPMENT

7.1 The programme evaluation and development procedures are intended to assess the:

(i) extent to which the aims and objectives are being met and what measures need to be taken to remedy any deficiencies identified, and

(ii) continuing relevance of the aims and subject objectives and the ways they need to be modified to take account of technological change and the development of Hong Kong's industries.

7.2 The programme evaluation procedures are conducted at two levels: firstly at the Programme Executive Group/Departmental Undergraduate Programme Committee level continuously through the year and secondly to the Departmental Undergraduate Programme Committee/Departmental Academic Advisor level at the end of each year. The first level is described in Section 6 of this document and the other below.

7.3 The Departmental Undergraduate Programme Committee holds its Annual Programme Review Meeting each year after the Board of Examiner has met as described in Section 5 of this document. The issues described in Section 6 are considered, particularly as revealed by the examination performance, and recommendations for action are made to remedy any deficiencies identified. Following the Annual Programme Review Meeting the Programme Leader submits the Annual Programme Review Report (which is encapsulated as part of the Annual Operation Plan) to the Engineering Faculty Board each year which, for the previous academic year,

(i) summarises the operation of the programme,

(ii) lists any modifications that are deemed necessary, and

(iii) makes proposals for substantial changes to the structure or content of the programme, or for changes with significant resource implications.

7.4 The Departmental Undergraduate Programme Committee adopts a policy of continuous improvement and is continuously evaluating the effectiveness and relevance of the Programme. This policy of continuous improvement includes soliciting the views of the Department's Advisory Committee, local industrialists, past graduates and the Departmental Academic Advisor.

7.5 The Programme is subject to an evaluation, normally every six years, as part of the PolyU's Departmental Review exercise. This is external to the Department and makes a critical appraisal of the standing, progress and future of all programmes that a department operates. The policy of continuous improvement as mentioned 7.4 attempts to render a major in-depth programme appraisal unnecessary prior to a Departmental Review.

SECTION 8 - SUBJECT SYLLABUSES AND PROJECTS

8.1 Syllabuses for all subjects and projects of the programme are listed in Table 8. Department of Industrial and Systems Engineering subjects are listed first, followed by subjects serviced by other departments. The subject coordinators for the ISE subjects will be updated regularly. Please access the departmental website https://www.polyu.edu.hk/ise/current-students/programme-related-info/subject-syllabus.

TABLE 8 - SYLLABUS INDEX

TABLE 8 - SYLLABUS INDEX CONTINUED

Subjects offered by
Department of Industrial and Systems Engineering

Subject Description Form

Subject Code	ISE246
Subject Title	Introduction to Logistics Engineering
Credit Value	3
Level	2
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. the basic concepts and practices in logistics engineering; 2. the knowledge of common logistics problems and solution techniques; 3. the enabling technologies that are likely to drive logistics progress in the near future; 4. the concepts and emerging trends of e-commerce logistics business; 5. an opportunity to understand the role of Hong Kong as the logistics and transportation hub of South China and the Pearl River Delta region.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. appreciate logistics activities involved in running a logistics system and the required enabling technologies; b. formulate strategic solutions applied in warehouse management in order to enhance productivity and accounting control issues; c. identify and evaluate the role of logistics and transportation in today's e-commerce business; d. understand the issues of transportation mode, customs clearance, intermodal operations, logistics parks, and cold chain in Hong Kong; e. apply RFID equipment, standards, and related solutions on logistics operations in order to streamline the logistics workflow.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> Logistics from a historical perspective; Economic impact of logistics; Logistics engineering tool chest; Logistics as an integrating function 2. <u>Logistics Activities</u> Customer service; Purchasing and sourcing; Demand forecasting; Facility location and layout; Inventory management; Material handling and material flow; Warehousing; Distribution networks; Transportation

systems overview

3. Enabling Technologies

Tracking technologies; Electronic connectivity and software; Reliability, maintainability, and supportability in logistics; Funding and justifying logistics activities; Logistics and the Internet

4. Emerging and Growing Trends

Global logistics concerns; Outsourcing and 3PLs; Logistics in service industries; Current and future logistics research needs; E-fulfillment in distribution centers; Hong Kong's role as the logistics and transportation hub

Teaching/Learning Methodology

A mixture of lectures, tutorials, laboratory exercises, and case studies are used to deliver the various topics in this subject, some of which are covered in a problem-based format, thereby enhancing the learning objectives. Others are covered through directed study in order to enhance the students' ability of "learning to learn."

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	
1. Laboratory Exercises	20%	✓		✓	✓	✓	
2. Individual Assignments	12%	✓	✓	✓	✓	✓	
3. Case Study	8%	✓	✓	✓			
4. Examination	60%	✓	✓	✓	✓	✓	
Total	100%						

Assessment includes examination, and individual-based and group-based performance measurements. The examination is designed to measure students' depth of knowledge in the area of logistics engineering. The case study is designed to reflect students' understanding on the enabling technologies taught, warehouse management, and other logistics engineering issues. The laboratory exercises and individual assignments are designed to appraise students' recommendations in addressing specific issues related to logistics engineering.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	24 Hrs.
▪ Laboratory/Case Study	15 Hrs.
Other student study effort:	
▪ Preparation for Case Study and Report Writing	33 Hrs.

	▪ Self-revision for Examination	30 Hrs.
	Total student study effort	102 Hrs.
Reading List and References	1. Leung, K. H., Cheng, Stephen W. Y., Choy, K. L., Wong, David W. C., Lam, H. Y., Hui, Y. Y., Tsang, Y. P. & Tang, Valerie. (2016). A Process-Oriented Warehouse Postponement Strategy for E-Commerce Order Fulfillment in Warehouses and Distribution Centers in Asia. In Patricia Ordóñez de Pablos (Eds.), *Managerial Strategies and Solutions for Business Success in Asia* (pp.21-34). Hershey, PA: IGI Glob. 2. Don Taylor, G 2008, *Introduction to Logistics Engineering*, Taylor and Francis Group, LLC 3. Jones, EC and Chung, CA 2008, *RFID in Logistics: A Practical Introduction*, Boca Raton: CRC Press/Taylor and Francis 4. Shepard, S 2005, *RFID: Radio Frequency Identification*, McGraw-Hill Publishing Company 5. Blanchard, BS 2003, *Logistics Engineering and Management*, 6th edn, Prentice Hall Inc., Upper Saddle River, NJ 6. Stock, R and Lambert, M 2001, *Strategic Logistics Management*, 4th edn, McGraw-Hill Publishing Company	

Subject Description Form

Subject Code	ISE247
Subject Title	Fundamental of Enterprise Systems
Credit Value	3
Level	2
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject enables students to 1. learn the business processes in an enterprise and how information is managed in an enterprise; 2. understand the characteristics and components of different enterprise systems and how enterprise systems can improve the efficiency and effectiveness of business activities; 3. understand the basic principles of enterprise modeling.
Intended Learning Outcomes	Upon completion of this module, students will be able to a. understand how information flows across enterprise systems and the business operations in an enterprise; b. analyze different enterprises and apply system concepts in both manufacturing and service industries; c. know the basic principle and components of enterprise modeling.
Subject Synopsis/ Indicative Syllabus	1. <u>Business Activities in Enterprise</u> Development of modern organization and enterprise engineering - Basic functional areas of organizations and business activities, such as account and financial management, sales and marketing, customer services, manufacturing and production cycle, and human resource planning; Information flow and collaboration across different functional areas of an enterprise; Need for new business and technology professionals; Benefits of adopting enterprise applications; Enterprise engineering 2. <u>Enterprise Information Systems and its Application to Enterprise Business</u> System concepts; Types and nature of enterprise systems; Classification by function and process; Managing information in an enterprise; Traditional classifications of enterprise information systems - Transaction processing system, such as systems for financial and accounting information, sales and marketing, human resource, manufacturing and production, enterprise resources planning, office automation (e.g., workflow system, GroupWare, and business processes management systems), knowledge work (e.g., CAD), decision support, management information, and

executive information; Software vendor products

3. Principles of Enterprise Modeling

What is a business process; Concept of process design; Basic component of enterprise modeling - Entity modeling, role modeling, process modeling, scenario modeling, information modeling, client/server modeling, dialog and action modeling, software component modeling, and workflow modeling

Teaching/Learning Methodology

The subject is delivered by a mixture of lectures, seminars, tutorials, case studies, and lab exercises. Lectures are conducted to initiate student exchange on concepts and techniques. Practical problems are raised as a focal point for discussion in tutorial classes. Seminars, case studies, and lab exercises, which are largely based on business and industrial experiences, are used to integrate these topics. These allow students to appreciate how various principles and technologies are interrelated and how they apply in real life situations. Quizzes are designed to enable students to periodically review their acquired knowledge, and consequently, to evaluate if the topics were understood.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c			
1. Lab Exercises	10%		✓	✓			
2. Seminar Studies	15%		✓	✓			
3. Case Studies	35%	✓	✓	✓			
4. Quizzes	40%	✓		✓			
Total	100%						

Continuous assessments consist of lab exercises, seminar reports, case studies, and quizzes. These are designed to help students achieve the intended learning outcomes. All components for assessment will require students to understand the basic principles and components of enterprise modeling. Lab exercises will require students to analyze and design an enterprise system by using computer-based tools. Seminar reports are designed to help students review and acquire a deeper understanding of the topics delivered during seminars. Case studies will require students to study a number of real-life enterprise systems and identify their benefits and impacts. Quizzes are designed to help students review, and assess the breadth and depth of their understanding on the concepts taught.

Student Study Effort Expected

Class contact:		
▪ Lecture	3 hours/week for 8 weeks	24 Hrs.
▪ Laboratory	3 hours/week for 1 week	3 Hrs.
▪ Tutorial/Case Study/Presentation		12 Hrs.

	Other student study effort:	
	▪ Preparation for Case Studies, Quizzes, and Lab Reports	74 Hrs.
	Total student study effort	113 Hrs.
Reading List and References	1. O'Brien, J and Marakas, G 2006, *Enterprise Information Systems*, McGraw-Hill 2. Dennis, A, Wixom, B, and Roth, R 2006, *Systems Analysis and Design*, 3rd edn, John Wiley & Sons 3. Schmuller, J 2004, *Sams Teach Yourself UML in 24 Hours, Complete Starter Kit*, 3rd edn, Sams 4. Miles, R and Hamilton, K 2006, *Learning UML 2.0*, O'Reilly, USA 5. Arlow, J and Neustadt, I 2005, *UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design*, 2nd edn, Addison Wesley 6. Hsu, C 1996, *Enterprise Integration and Modeling: The Metadatabase Approach*, Kluwer Academic Publisher 7. Kendall, K and Kendall, J 2005, *System Analysis and Design*, 6th edn, Prentice Hall 8. Whitten, J and Bentley, L 2005, *System Analysis and Design Methods*, 5th edn, McGraw-Hill 9. Wasson, C, 2006, *System Analysis, Design, and Development: Concepts, Principles, and Practices*, John Wiley & Sons 10. Vernadat, F, B 1996, *Enterprise Modeling and Integration: Principles and Applications*, Chapman & Hall 11. Marshall, C 2000, *Enterprise Modeling with UML: Designing Successful Software Through Business Analysis*, Addison-Wesley	

Subject Description Form

Subject Code	ISE318
Subject Title	Industrial Engineering Techniques and Methods
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil (but some basics of mathematics such as matrix and probability are preferable)
Objectives	This subject provides students with 1. basic skills for analyzing and improving working methods, procedures and systems in the context of the work stations and a department, taking into account ergonomic considerations in order for them to carry out a project on work improvement in a company for the purpose of productivity improvement; 2. skills in the use of learning curve, as well as a basic understanding of the techniques and concepts of Just-In-Time, Toyota Production System, and Lean Production, thereby allowing them to draft measures for efficiency improvement and waste reduction in industrial engineering; 3. ability to use multi-criterion decision making method (Analytic Hierarchy Process) in order for them to draft industrial decision planning and evaluation (i.e. layout plan selection, human resource strategy, best available technology, sustainable manufacturing); 4. working knowledge on the techniques for facilities layout and their interaction with materials handling system (if relevant), thereby enabling them to evaluate an existing layout and recommend improvements and/or to plan a new layout; 5. basic skills of calculating cycle time, line efficiency, understanding the basic rules for work improvement, mastering the common recording techniques, systems flowchart, quality management tools, and basics for product development (design of goods and service, product life cycle and decision tree to product design).
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. determine productivity and examine an existing work situation and conduct a work improvement program in order to identify low productivity in a manufacturing or service company; b. apply appropriate recording techniques, or to design new work methods and procedures, for a manufacturing or service company, and apply lean production methods; c. employ the multi-criterion decision making method (AHP) for industrial decision planning and evaluation;

<table>
<tr><td></td><td>d. master the total quality management tools, the basics of product development, analyze the results, and use line balancing theory for applications, and propose suggestions for improvement for industrial engineering;

e. identify the objectives of layout planning in both manufacturing and service companies, evaluate its effectiveness, and apply layout planning techniques, recognizing their limitations when considering relevant constraints.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>1. <u>Introduction</u>

Productivity; Causes of low productivity in organizations; Resources and outputs, their importance, brief history of industrial engineering techniques and methods, and how they are measured.

2. <u>Work Improvement</u>

Leaning Curves. Just in Time (JIT), Toyota Production System/Lean Production. Human resources strategy and job design. Industrial Decision planning and evaluation: Analytical Hierarchy Process (AHP) and multi-criterion decision-making. Layout Planning. Inter relationships among entities. Types of layout manufacturing and offices. Layout planning techniques. Line balancing. Procedure diagrams. Line balancing applications. Flow time, cycle time, line efficiency; Systems flowchart; Recording techniques. Work improvement, benefits, the logical approach, the Pareto Principles, identifying improvement areas in enterprise. Interview Personnel. Recording Techniques.

3. <u>Quality Management and Product development</u>

Quality management. Dimensions of quality. "Costs" of Quality. Total quality management tools. Seven Quality Control tools. ISO 9000 Series of Quality Standards. Design of goods and service. Product Life Cycle. Product Development (Quality Function Deployment). Decision tree to product design. Project management.

4. <u>Layout Planning</u>

Objectives, types of layout found in the manufacturing industry and the clerical sector; Systematic layout planning, as applied to manufacturing and clerical work; Introduction to the design of flowlines in manufacturing; Line balancing; Techniques; Efficiency of assembly lines; Balance loss.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorial exercises, and case studies are used to deliver the various topics in this subject, some of which are covered in a problem-based format, as these can enhance the learning objectives. Others are covered through directed study in order to enhance the students' ability of "learning to learn." Some case studies, largely based on consultancy experience, are used to integrate the topics, thus demonstrating to students how the various techniques are interrelated and how they can be applied in real work situations.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific Assessment Methods/Tasks</td><td rowspan="2">% Weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
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<table>
<tr><td></td><td>
<table>
<tr><td>1. Continuous Assessment (Two Combined Case Studies, each comprising 20% each)</td><td>40%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination (Open Book)</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>
Continuous assessment comprises case studies with individual and group components. Note: Questions for the assessment of Intended Learning Outcomes (ILOs) may vary from year to year in terms of whether they are by Continuous Assessment or by Examination. However, all ILOs are covered each year. Moreover, all assessment components require students to apply what they learned to realistic work applications.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td colspan="2">Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/Tutorial</td><td>3 hours/week for 11 weeks</td><td>33 Hrs.</td></tr>
<tr><td>▪ Laboratory/Case Study</td><td>3 hours/week for 2 weeks</td><td>6 Hrs.</td></tr>
<tr><td colspan="2">Other student study effort:</td><td></td></tr>
<tr><td colspan="2">▪ Studying and Self-learning</td><td>38 Hrs.</td></tr>
<tr><td colspan="2">▪ Case Study and Report Writing</td><td>28 Hrs.</td></tr>
<tr><td colspan="2">Total student study effort</td><td>105 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

1. Heizer, Jay and Render, Barry, 2014, *Principle of Operations management*, 9th edition, Pearson

2. Mundel ME and Danner DL 1994, *Motion and Time Study: Improving Productivity*, 7th edn, Prentice Hall

3. Tompkins, JA, White, JA, Bozer, YA, Tanchoco, JMA, and Trevino J 1996, *Facilities Planning*, 2nd edn.

4. Gavriel Salvendy (Ed.) 2007, *Industrial Engineering Handbook*, John Wiley & Sons Ltd.

Note: Other books with the same or similar titles as above can also be used.
</td></tr>
</table>

Subject Description Form

Subject Code	ISE330
Subject Title	Product Safety and Reliability
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Knowledge of calculus & statistics
Objectives	This subject is designed to provide students with an overview of the legal, regulatory, and contractual obligations related to product safety and reliability, as well as the approaches to managing compliance to these obligations.
Intended Learning Outcomes	Upon completion of this subject, students will be able to a. be aware of the safety and reliability requirements in product development; b. evaluate compliance for product safety marks; c. apply relevant methodologies and tools to identify, assess, and mitigate product risks; d. quantify product risks and perform simple failure data analysis.
Subject Synopsis/ Indicative Syllabus	1. <u>Product Liabilities</u> Evolution of product liability concepts: strict liability, tort, warranty; Approaches to mitigating liability; and Product recalls 2. <u>Product Safety Standards</u> Consumer product safety acts, Consumer Product Safety Commission (CPSC), national and international safety standards, and compliance for product safety marks 3. <u>Product Risk Management</u> Availability, reliability, safety and security; Product risk management program 4. <u>Product Safety and Reliability Practices</u> Establishing product safety and reliability policy, FMECA, FTA, HAZOP, HACCP, safety and reliability testing, root cause analysis; Case studies 5. <u>Analytical Methods for Product Risk Assessment</u> Quantification of risk and failure data analysis

<table>
<tr><td>Teaching/Learning Methodology</td><td>A combination of lectures, tutorial exercises, and case studies is used to deliver the various topics in this subject. Some of the topics are delivered in a problem-based format to enhance the effectiveness of achieving the learning outcomes. Other topics are covered through directed study or mini-projects designed to enhance students' self-learning skills. Some of the coursework is designed to develop students' ability to apply knowledge in managing product risks.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1. Examination</td><td>60%</td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Continuous Assessment</td><td>40%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>▪ Quizzes/Reflective Journals/Assignments (20%)</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>▪ Case study (20%)</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="6"></td></tr>
</table>
Examination and continuous assessments that take the forms of quizzes and in-class or take-home assignments are designed to assess students' ability to apply the knowledge introduced in the subject in analyzing and solving product safety and reliability problems. Students' performance in these tasks is evaluated individually. The case study is group based and is designed to test students' ability to identify, assess, and mitigate risks in the design of a selected product and to determine the process for obtaining the applicable safety marks. It is assessed based on performance in an oral presentation and the merit of a written report. Students' reflective journals on the case study presentations made by their peer groups are also assessed.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact</td><td></td></tr>
<tr><td>▪ Lecture 2 hours/week for 13 weeks</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial/Case Study/Assessments 1 hour/week for 13 weeks</td><td>13 Hrs.</td></tr>
<tr><td>Other student study efforts</td><td></td></tr>
<tr><td>▪ Self study: review lecture materials, compile reflective journal, and prepare for examination</td><td>32 Hrs.</td></tr>
<tr><td>▪ Case study: information gathering, group discussion, preparation of oral presentation, and written report</td><td>39 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>110 Hrs.</td></tr>
</table>
</td></tr>
</table>

Reading List and References	1. Abbot, H & Tyler, M 1997, *Safer by Design: A Guide to the Management and Law of Designing for Product Safety*, 2/e Gower 2. Geistfeld, M A 2011, *Principles of Products Liability*, 2/e, Foundation Press 3. Owen, D G & Davis, M J 2015, *Products Liability & Safety: Cases and Materials*, 7/e, Foundation Press 4. Owen, D G & Davis, M J 2015, *Products Liability & Safety: Cases and Materials 2015-2016 Statutory Supplement*, 7/e, Foundation Press 5. *IEC 60300-1 Dependability Management – Part 1: Guidance for management and application*, 2014 3/e 6. *IEC 60300-3-1 Dependability Management – Part 3-1: Application Guide – Analysis Techniques for Dependability – Guide on Methodology*, 2003 2/e

Subject Description Form

Subject Code	ISE369
Subject Title	Quality Engineering
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	AMA1110 Basic Mathematics I – Calculus and Probability & Statistics or AMA1103 Introductory Linear Algebra or AMA1104 Introductory Probability
Objectives	The subject will provide students with 1. knowledge of the modern concept of quality; 2. appreciation of the functions served by a quality management system; 3. ability to design quality products to satisfy both internal and external customers; 4. ability to control process performance using appropriate statistical tools; 5. ability to diagnose quality problems and develop sustainable improvement.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. apply the modern concepts of quality and quality management system to solve the existing quality problems of a company; b. obtain design quality from internal and external customers and formulate plans thereof; c. use appropriate statistical tools for better process control; d. diagnose quality problems and develop substainable improvement.
Subject Synopsis/ Indicative Syllabus	1. <u>Quality Management Processes</u> Modern quality concepts; Quality planning, quality control, and quality improvement; New and old 7-QC tools 2. <u>Design for Quality</u> Reliability fundamental, life distribution, failure rate prediction, and estimation; Failure mode, effects, and criticality analysis (FMECA); Fault tree analysis (FTA);Taguchi approach to achieving quality; Design reviews 3. <u>Statistical Quality Control</u> Process variation; Process capability study; Control charts; Statistical tolerancing; Acceptance sampling plans 4. <u>Partnership with Suppliers</u>

<table>
<tr><td></td><td>
Vendor evaluation; Joint planning with suppliers; Best practices of partnership with suppliers

5. <u>Quality Management Systems</u>

ISO 9000 series of standards; Quality audits; Product and system certification programs

6. <u>Quality Improvement</u>

Project approach to quality improvement; Diagnostic techniques for identifying root causes; Implementing change and substaining gains
</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The major teaching activities contain a combination of lectures, tutorials, and practical exercises to achieve the objectives of this subject. Some of the topics are not taught in the classroom environment; students are directed to learn these topics by themselves during the process of writing problem-based assignments.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Assignment & tests</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Case Studies</td><td>10%</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>
The continuous assessment involves three components: two tests (10%), two case studies (10%), and four take-home assignments (20%). The tests aim to assess the interim knowledge gained by the students. The assignments are designed to assess students' ability to apply the equations in assessing the performance of the processes. The case study requires students to complete two team projects involving quality improvement and quality management. The results of the case study are presented both orally and in written form. The final examination is also used to assess the abilities of students in achieving the learning outcomes of the subject.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact</td><td></td></tr>
<tr><td>▪ Lecture 2 hours/week for 13 weeks</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial/Case Study 1 hour/week x 13 weeks</td><td>13 Hrs.</td></tr>
<tr><td>Other student study efforts</td><td></td></tr>
<tr><td>▪ Self Study/Assignment</td><td>58 Hrs.</td></tr>
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	▪ Case Study	13 Hrs.
	Total student study effort	110 Hrs.
Reading List and References	1. Montgomery, D C 2009, *Introduction to Statistical Quality Control*, 6th edition, John Wiley 2. Gryna, F M 2000, *Quality Planning & Analysis*, 4th edition, McGraw Hill 3. ISO 9001: 2008, *Quality Management Systems – Requirements*	

Subject Description Form

Subject Code	ISE3002
Subject Title	Planning of Production and Service Systems
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. an understanding of the concepts of production and service systems; 2. the ability to apply principles and techniques in the design, planning and control of these systems to optimize/make best use of resources in achieving their objectives.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. apply the systems concept for the design of production and service systems; b. make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques; c. apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources; d. understand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances.
Subject Synopsis / Indicative Syllabus	*1.* *The Systems Concept* The transformation model of production systems. The boundary and attributes of a socio-technical production system. Effects of the environmental factors. Systems balance and sub-optimization. The need for systems integration and adaptation to environment. *2.* *Forecasting* Production demand management. Qualitative and quantitative methods in forecasting. Forecasting errors and control. Forecasting and its relationship to capacity planning. *3.* *Capacity Planning* Capacity measurement. Aggregate units. Manual and mathematical methods for aggregate planning. Master production scheduling.

4. *Inventory Control and Material Requirement Planning (MRP)*

Independent inventory control and management; Types of inventory; Continuous review and periodic review systems; Reorder level and order quantities, including quantity discounts; ABC analysis. Planning of dependent inventory; MRP concepts and principles; Lot sizing

5. *Operations Loading and Scheduling*

Gantt charts for loading and scheduling. Techniques and algorithms for operations scheduling and Personnel Scheduling

6. *Just-in-time and Lean Manufacture*

Push and pull systems of production control; Advantages and limitations; Set-up and changeover times and their reduction; Use of Kanban; Effect on inventory; Issues of implementation

Teaching/Learning Methodology

A mixture of lectures, tutorial exercises, case studies and laboratories will be used to deliver the various topics in this subject to attain the intended learning outcomes. Some of which will be covered in a problem-based format where this enhances the learning outcomes. Others will be covered through directed study in order to enhance the students' ability of "learning to learn". Tutorials and laboratories are conducted as group activities so that students can discuss, practice and understand materials in the class. Case studies and simulation exercises will be provided to provoke students' further thinking about and integration of the factors related to real life problem solving in the discipline of studies.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% Weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignments/case studies/presentation	20%	✓	✓	✓	✓
2. Laboratory works	20%		✓	✓	
3. Examination	60%	✓	✓	✓	✓
Total	100%				

The assignments/case studies assess students' ability to synthesize and apply the concepts and skills learnt in solving problems related to the subject.

The laboratory exercises assess students' capability in the planning and control of activities in production and service systems to optimize/make the best use of resources to attain system's objectives.

The examination assesses students' understanding on the concepts and in the use of the skills in solving problems related to the subject.

Student Study Effort Expected	Class Contact:		
	▪ Lecture	2.0 hours/week for 12 weeks	24 Hrs.
	▪ Tutorial	2.0 hours/week for 5 weeks	10 Hrs.
	▪ Laboratory	2.5 hours/week for 2 weeks	5 Hrs.
	Other student study effort:		
	▪ Studying and self learning		59 Hrs.
	▪ Assignment and report writing		25 Hrs.
	Total student study effort		123 Hrs.
Reading List and References	1. Krajewski, L J, Ritzman, L P and Malhotra, M K 2013, *Operations Management: Processes and Supply Chains*, Upper Saddle River, N.J.: Pearson/Prentice Hall 2. Nahmias, S 2009, *Production and Operations Analysis*, 5th edn, McGraw-Hill 3. Schroeder, R G, Goldstein, S M and Rungtusanatham, M J 2013, *Operations Management : Contemporary Concepts and Cases*, New York, NY : McGraw-Hill/Irwin 4. Chase, R B., Aquilano, N J, and Robert, J F 2006, *Operations Management for Competitive Advantage*, Boston: McGraw-Hill Irwin 5. Shafer, S M and Meredith, J R 2003, *Operations Management*, New York: John Wiley & Sons 6. Vollmann, T E et al. 2005, *Manufacturing Planning and Control Systems for Supply Chain Management*, New York: McGraw-Hill 7. Turner, W C et al. 2001, *Introduction to Industrial and Systems Engineering*, Beijing : Tsing Hua University: Prentice Hall 8. Schroeder, R G and Flynn, B B 2001, *High Performance Manufacturing: Global Perspectives*, New York: John Wiley 9. Sipper, D and Bulfin, R L Jr 1997, *Production: Planning, Control, and Integration*, McGraw-Hill 10. Markland, R E, Vickery, S K, and Davis, R A 1998, *Operations Management: Concepts in Manufacturing and Services*, Cincinnati, Ohio : South-Western College Pub		

Subject Description Form

Subject Code	ISE3006
Subject Title	Materials and Processes Selection
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject will provide the students with 1. an understanding of properties and applications of engineering materials; 2. an understanding of working principles of basic manufacturing processes for common materials; 3. an understanding of the interaction between material, shape, process and functional requirements of products in the materials and processes selection; 4. the knowledge of a systematic approach to the choice of materials and processes for a range of products, with consideration of economical, technological and environmental factors.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. exemplify the importance of engineering materials in product design; b. recognize the availability of different processing routes for the manufacture of a product; c. establish a link between material, shape, process and functional requirements of a product in materials and process selection; d. apply suitable methodologies to perform materials selection and determine appropriate manufacturing processes to achieve desired shapes and functional requirements for a range of products with respect to economical, technological and environmental factors.
Subject Synopsis/ Indicative Syllabus	***1. Properties, Applications and Selection of Engineering Materials*** Ferrous and non-ferrous alloys, engineering plastics, ceramics and composites; Properties of engineering materials and their applications. Materials selection charts, performance maximizing criteria, material indices based on Ashby's analysis. ***2. Fundamentals of Manufacturing Processes*** Classification of manufacturing processes; *metal processing technologies*: casting, powder metallurgy, bulk formation, sheet metal forming, conventional and non-conventional material removal; *polymer processing*

technologies: injection molding, compression and transfer molding, extrusion, thermoforming, rotational molding, advanced molding technologies; joining and surface finishing processes.

3. Process Selection and Economic Consideration

Process screening by attributes: material, size, shape, accuracy, surface finish, bulk and surface properties; economic production capabilities of typical processes: equipment and tooling cost, production rate, and economic production quantity.

Teaching/Learning Methodology

Theories of the technologies involved are introduced in the lectures via a case study approach. The materials and processes selection are supported by using a software package "CES" in the Digital Factory of the Department. Tutorials are used to facilitate the understanding of such theories as well as the interaction between material, process, shape and function through group discussions and case studies, whereas a mini-project is used to review students' understanding of process selection.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d		
1. Assignments	20%	✓	✓	✓	✓		
2. Mini-project	10%	✓	✓	✓	✓		
3. Test	10%	✓	✓	✓	✓		
4. Examination	60%	✓	✓	✓	✓		
Total	100%						

The assignments are designed to reflect students' understanding of the subject and to assist them in monitoring their progress.

The mini-project is designed to assess the student's ability in selecting appropriate materials and manufacturing processes for particular components or products with consideration to technical, economical and environmental aspects of the available processes.

The test and examination are used to assess the students' understanding of the subject content and to determine their ability in achieving the subject learning outcomes after the subject has been completed.

Student Study Effort Required

Class contact	
▪ Lectures	26 Hrs.
▪ Tutorials and laboratory work	13 Hrs.
Other student study efforts	

	▪ Preparation for assignments, mini-project and laboratory report	27 Hrs.
	▪ Self-study and preparation for test and examination	57 Hrs.
	Total student study effort	123 Hrs.
Reading List and References	1. Kalpakjian, S & Schmid, K S 2010, *Manufacturing Engineering and Technology*, New York: Prentice Hall. 2. Schey, J A 2000, *Introduction to Manufacturing Processes*, Boston: McGraw Hill. 3. Groover, M P 2010, *Fundamentals of Modern Manufacturing: Materials, Processes and Systems*, Hoboken, NJ: Wiley. 4. Ashby, MF 2011, *Materials Selection in Mechanical Design*, Butterworth-Heinenann, Oxford. 5. Callister, WD, Rethwisch, DG 2008, *Fundamentals of Materials Science and Engineering: An integrated approach*, John Wiley & Sons, Hoboken, NJ.	

Subjects offered by
Department of Applied Mathematics

Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA1110</td></tr>
<tr><td>Subject Title</td><td>Basic Mathematics I – Calculus and Probability & Statistics</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>1</td></tr>
<tr><td>Pre-requisite</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>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.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
(a) apply analytical reasoning to solve problems in science and engineering;
(b) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;
(c) apply mathematical modeling in problem solving;
(d) demonstrate abilities of logical and analytical thinking.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Elementary calculus: Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus.

Elementary Probability and Statistics: 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.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and elementary techniques of differential and integral calculus and elementary statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Assignments and mid-term tests</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>
</table>
Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">mathematical techniques in solving problems in science and engineering.

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. 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.</td></tr>
<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Homework and self-study</td><td>81 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Chung, K.C. A Short Course in Calculus and Matrices, McGraw Hill 2013

Hung, K.F., Kwan, Wilson, Pong, T.Y. Foundation Mathematics & Statistics, McGraw Hill 2013

Larson, R., Edwards, B. Single Variable Calculus, Brooks/Cole 2012

Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. Probability and Statistics for Engineers and Scientists, Prentice Hall, 2012</td></tr>
</table>

Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA1120</td></tr>
<tr><td>Subject Title</td><td>Basic Mathematics II –Calculus and Linear algebra</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>1</td></tr>
<tr><td>Pre-requisite</td><td>Basic Mathematics I – Calculus and Probability & Statistics (AMA1110)</td></tr>
<tr><td>Objectives</td><td>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.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
(a) apply analytical reasoning to solve problems in science and engineering;
(b) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;
(c) apply mathematical modeling in problem solving;
(d) demonstrate abilities of logical and analytical thinking.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Elementary calculus: Mean Value Theorem with applications to optimization and curve sketching. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and physics. Improper Integrals.

Linear algebra: Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer’s rule, vectors in 2-space or in 3-space, applications to geometry.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Assignments and tests</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>
</table>

Continuous Assessment comprises of assignments and tests. An examination is held at the end of the semester.

Questions used in assignments, tests and examinations are used to assess students’ level of understanding of the basic concepts and their ability to use</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">mathematical techniques in solving problems in science and engineering.

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 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.</td></tr>
<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Homework and self-study</td><td>81 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Chung, K.C. A Short Course in Calculus and Matrices, McGraw Hill 2013

Hung, K.F., Kwan, Wilson, Pong, T.Y. Foundation Mathematics & Statistics, McGraw Hill 2013

Larson, R., Edwards, B. Single Variable Calculus, Brooks/Cole 2012

Larson, R. Elementary Linear Algebra, Brooks/Cole 2013</td></tr>
</table>

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus and Linear Algebra (AMA1007) or Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120) or Calculus for Engineers (AMA1130) or Foundation Mathematics for Accounting and Finance (AMA1500)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007) Introduction to Differential Equations (AMA2008) Mathematics for Engineers (AMA2308) Engineering Mathematics (AMA2380) Applied Mathematics I (AMA2511) Mathematics for Scientists and Engineers (AMA2882) Engineering Mathematics (AMA290)
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	1. <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. Differential calculus of functions of several variables

Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.

Teaching/Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

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.

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, *Basic Engineering Mathematics*, McGraw-Hill, 2015.

	2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited 5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017

Subjects offered by
Department of Applied Physics

Subject Description Form

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

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
(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 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort	120 h

Reading List and References

John D. Cutnell & Kenneth W. Johnson, **Introduction to Physics**, 9th edition, 2013, John Wiley & Sons.

Hewitt, **Conceptual Physics**, 11th edition, 2010, Benjamin Cummings.

Subject Description Form

Subject Code	AP10008
Subject Title	University Physics I
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) solve simple problems in single-particle mechanics using calculus and vectors; (b) solve problems in mechanics of many-particle systems using calculus and vectors; (c) understand simple harmonic motion and solve simple problems; (d) solve problems related to acoustic standing waves; (e) calculate changes in frequency received due to Doppler's effect; (f) apply ideal gas laws to solve problems; (g) apply the first law of thermodynamics to simple processes; and (h) solve simple problems related to the cyclic processes.
Subject Synopsis/ Indicative Syllabus	**Mechanics**: calculus-based kinematics, dynamics and Newton's laws; calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; conservation law; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves and beats. **Thermal physics**: conduction, convection and radiation; black body radiation; ideal gas and kinetic theory; work, heat and internal energy; first law of thermodynamics; entropy and the second law of thermodynamics; Carnot cycle; heat engine and refrigerators.
Teaching/Learning Methodology	**Lecture**: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							
		a	b	c	d	e	f	g	h
(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 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort:	120 h

Reading List and References

John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2014, 9th edition, Brooks/Cole Cengage Learning.

Hafez A. Radi, John O. Rasmussen, "Principles of physics: for scientists and engineers", 2013, Springer.

W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.

Subject Description Form

Subject Code	AP10009
Subject Title	University 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 Learning Outcomes	Upon completion of the subject, students will be able to: (a) apply simple laws in optics to explain image formation; (b) understand phenomena related to the wave character of light; (c) solve problems in electrostatics; (d) solve problems on interaction between current and magnetic field; (e) apply electromagnetic induction to various phenomena; and (f) solve problems in simple circuits.
Subject Synopsis/ Indicative Syllabus	**Waves and optics**: nature of light, reflection and refraction; Snell's law; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen's principle; interference and diffraction; diffraction grating; Rayleigh's criterion and optical resolution; polarization. **Electromagnetism**: charge and Field; Coulomb's law and Gauss' law; electrostatic field and potential difference; capacitors and dielectric; current and resistance; Ohm's law; electromotive force, potential difference; Lorentz force; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; induction; transformers; AC circuits and applications.
Teaching/Learning Methodology	**Lecture**: The fundamentals in optics and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	
(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 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort	120 h

Reading List and References

John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2014, 9th edition, Brooks/Cole Cengage Learning.

Hafez A. Radi, John O. Rasmussen, "Principles of physics: for scientists and engineers", 2013, Springer.

W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.

Subject offered by
Chinese Language Centre

Subject Description Form

Subject Code	CLC1105C (Cantonese) / CLC1105P (Putonghua) [2019-20 onward] / CBS1105C (Cantonese) / CBS1105P (Putonghua) [2018-19 and before] (for 42375)
Subject Title	University Chinese for Higher Diploma Students 大學中文（高級文憑課程) *Remarks: Students taking the Cantonese version of CLC/CBS1105 (i.e. CLC/CBS1105C) will be offered a 39 hour non-credit bearing e-learning course in Putonghua (optional).*
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Students with HKDSE Chinese subject result at level 2 or equivalent
Objectives	This subject aims at enhancing higher diploma students' command of Chinese language knowledge to communicate accurately and appropriately in both written and spoken forms, with particular reference to their basic proficiency in Chinese at the tertiary level.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. Improve their Chinese language ability by revising the most common grammatical errors in written texts in terms of accuracy, relevance, appropriateness and completeness; 2. Demonstrate the basic logic, format, structure and potentials behind Chinese writing; 3. Make use of the resources available in producing different genres such as expository / persuasive / argumentative tasks, according to the different communicative purposes; 4. Perform oral presentations in a clear and systematic way.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** <u>Category B: Attributes for all-roundedness</u> Programme Outcome 8.
Subject Synopsis/ Indicative Syllabus	1. Written communication • editing language errors to develop the awareness of choice of words. • enhancing basic competence in the skill of summarizing • producing a topic in a systematic way with linguistic accuracy, clear arguments and logical structure. • applying expository/persuasive/argumentative skills to practical usage. 2. Spoken communication • different strategies to convey messages in a well-structured way. • appropriate verbal and non-verbal strategies in oral interactions to convince people. • effective skills of seeking clarity/consent/disagreement/answer to a question • critical thinking skills for group discussions of issues. 3. Language development • vocabulary building and word choice. • accuracy in Chinese language usage.

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. Additional reference materials will be recommended as required.

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
Quizzes / Exercises	35%	√	√		
Written Assignments	45%	√	√	√	
Oral presentation	20%	√	√	√	√
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 (2). The writing assessments aim to obtain an objective measurement of students' basic competence in the use of written Chinese with 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), (2), (3) and (4)). In addition to these assessments, students are required to complete further language training through web-based language work. 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：《生活錯別字》，香港：中華書局，2000年。 13. 陳瑞端，《生活病語》，香港：中華書局，2000。 14. 賴蘭香：《傳媒中文寫作》(新修本)，香港：中華書局，2012年。
Last Updated	May 2019
Prepared by	Chinese Language Centre

Subjects offered by
English Language Centre

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	ELC1007
Subject Title	University English for Higher Diploma Students I
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	NIL
Objectives	This subject aims to help higher diploma students entering with HKDSE English Language Level 2 to study effectively in an English medium tertiary learning environment, and to acquire English skills to enable them to further their studies at university.
Intended Learning Outcomes	Upon successful completion of the subject, students will be able to: a. plan and write a text that effectively describes data b. plan and write a well-structured and coherent comparison and contrast text c. employ appropriate and effective verbal and non-verbal skills in oral presentations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present information logically and coherently.
Subject Synopsis/ Indicative Syllabus	1. Written communication Analysing and practising common writing functions; improving the ability of writing topic sentences and concluding sentence; developing skills in descriptive writing description; employing appropriate strategies for paragraph development; understanding common patterns of organisation in writing; improving coherence and cohesion in writing; developing revision and proofreading skills. 2. Spoken communication Recognising the differences between spoken and written communication in English in university study contexts; identifying and practising verbal and non-verbal interaction strategies in oral presentations. 3. Language development Improving and extending relevant features of grammar, vocabulary and pronunciation; developing appropriate academic reading and listening skills.
Teaching/Learning Methodology	The study method is a combination of seminar, self-access work and online learning. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class work and online learning. Students make use of elearning resources to further improve their proficiency and English 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

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	
1. Writing a descriptive text	25%	✓			
2. Writing an essay	30%		✓		
3. Oral presentation	40%			✓	
4. Participation	5%	✓	✓	✓	
Total	100%				

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

Assessment 1 demonstrates achievement of LO (a) for students to plan, write and revise a descriptive text. Assessment 2 necessitates achievement of LO (b) in order for students to write an accurate and coherent text. Assessment 3 requires students to demonstrate their achievement of LO (c).

In addition to these assessments, students are required to complete further language training through web-based language work. The additional language training offered in online tasks is aligned with all the three LOs.

Student Study Effort Expected

Class contact:	
▪ Seminars	39 Hrs.
Other student study effort:	
▪ Self-study /preparation	78 Hrs.
Total student study effort	117 Hrs.

Reading List and References

Course material

Learning materials developed by the English Language Centre

Recommended references

Bailey, S. (2014). Academic writing: a handbook for international students. Abingdon: Routledge.

Comfort, J. (2001). Effective presentations. Oxford: Cornelsen & Oxford University Press.

Hung, T. T. N. (2005). *Understanding English grammar: A course book for Chinese learners of English*. Hong Kong: Hong Kong University Press.

	McWhorter, K. T. (2012). *The successful writer's handbook.* (2nd ed.). Boston, MA: Longman. Tang, R. (2012). Academic writing in a second or foreign language: Issues and challenges facing ESL/EFL academic writers in higher education contexts. London: Continuum International Pub. Templeton, M. (2010). *Public speaking and presentations demystified.* New York, NY: McGraw-Hill. Zwier, L. J. (2002). *Building academic vocabulary.* Ann Arbor, MI: University of Michigan Press.

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	ELC1008
Subject Title	University English for Higher Diploma Students II
Credit Value	3
Level	1
Pre-requisite / ~~Co-requisite/ Exclusion~~	ELC1007 University English for Higher Diploma Students I
Objectives	This subject aims to help higher diploma students entering with HKDSE English Language Level 2 to study effectively in an English medium tertiary learning environment, and to enhance their proficiency and communication skills in English.
Intended Learning Outcomes	Upon successful completion of the subject, students will be able to: a. plan, write and revise academic essays. b. refer to sources in written texts by using summarising, paraphrasing and synthesising skills c. use appropriate verbal and non-verbal skills in spoken communication in a group context 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 Further developing the ability of writing succinct topic sentences and employing appropriate strategies for paragraph development; taking effective notes from written and spoken sources; further developing the skills needed for effective use of sources in written texts; further extending coherence and cohesion in writing; revising and proofreading effectively. 2. Spoken communication Further developing the verbal and non-verbal strategies in oral interactions; developing and applying critical thinking skills to discussions of issues. 3. Language development Further improving and extending relevant features of grammar, vocabulary and pronunciation; extending appropriate reading and listening skills.
Teaching/Learning Methodology	The study method is a combination of seminar, self-access work and online learning. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class work and online learning. Students make use of elearning resources to further improve their proficiency and academic English 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)			
		a	b	c	
1. Academic essay (first draft)	30%	✓	✓		
2. Extended academic essay (final)	30%	✓	✓		
3. Group discussion	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 (a) and (b) in order for students to write effective extended essays. Assessment 3 requires students to demonstrate their achievement of LO (c).

In addition to these assessments, students are required to complete further language training through web-based language work. The additional language training offered in online tasks is aligned with all the three LOs.

Student Study Effort Expected

Class contact:	
▪ Seminars	39 Hrs.
Other student study effort:	
▪ Self study/preparation	78Hrs.
Total student study effort	117 Hrs.

Reading List and References

Course material

Learning materials developed by the English Language Centre

Recommended references

Bailey, S. (2014). Academic writing: a handbook for international students. Abingdon: Routledge.

Bullock, R. & Weinberg, F. (2001). *The little seagull handbook*. New York, N.Y.: W.W. Norton & Co.

Engleberg, I. (2013). *Think: Public speaking.* Boston, MA: Pearson.

Hung, T. T. N. (2005). *Understanding English grammar: a course book for*

	Chinese learners of English. Hong Kong: Hong Kong University Press. Parker, G. M. & Hoffman, R. (2006). *Meeting excellence: 33 tools to lead meetings that get results*. San Francisco, CA: Jossey-Bass. Tang, R. (2012). Academic writing in a second or foreign language: Issues and challenges facing ESL/EFL academic writers in higher education contexts. London: Continuum International Pub.

Subjects offered by
Faculty of Engineering

Subject Description Form

Subject Code	ENG2001
Subject Title	Fundamentals of Materials Science and Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To realize the impact of the development of engineering materials on human civilization; 2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems. 3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in service performance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. comprehend the importance of materials in engineering and society; b. explain the properties and behaviour of materials using fundamental knowledge of materials science. c. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials; d. select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.
Subject Synopsis/ Indicative Syllabus	1. <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. Mechanical Properties of Materials

Concept of stress and strain; Stress-strain behaviour; Elastic and plastic properties of materials; Concepts of dislocations and strengthening mechanisms; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Impact energy, Fracture toughness; Design and safety factors

5. Introduction to Failure Analysis and Prevention

Fundamentals of fracture: ductile, brittle, fatigue and creep; Corrosion; Nondestructive testing; Techniques for failure analysis and prevention

6. Selection of Engineering Materials

Characteristics of metallic, polymeric, ceramic, electronic and composite materials; Economic, environmental and recycling issues

Teaching/Learning Methodology

The subject will be delivered mainly through lectures but tutorials, case studies and laboratory work will substantially supplement which. Practical problems and case studies of material applications will be raised as a focal point for discussion in tutorial classes, also laboratory sessions will be used to illustrate and assimilate some fundamental principles of materials science. The subject emphasizes on developing students' problem solving skills.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d		
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 (b). The test and examination are for determining students' understanding of key concepts as well as for assessing their achievement of the learning outcomes.	
Student Study Effort Expected	Class contact:	
	▪ Lectures, tutorials, practical	39Hrs.
	Other student study effort:	
	▪ Guided reading, assignments and reports	37Hrs.
	▪ Self-study and preparation for test and examination	47Hrs.
	Total student study effort	123Hrs.
Reading List and References	1. William D. Callister, Jr., David G. Rethwisch, *Fundamentals of materials science and engineering*, 4th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-53126-6 2. William D. Callister, Jr., David G. Rethwisch, *Materials Science and Engineering*, 8th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-37325-5 3. Materials World (Magazine of the Institute of Materials, Minerals and Mining)	

Revised (April 2014)

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: Category A: Professional/academic knowledge and skills 1. Understand the functions and features of modern computing systems. 2. Understand the client-server architecture and be able to set up multiple internet applications. 3. Understand the principles of computer networks and be able to set up simple computer networks. 4. Understand the basic structure of a database system and be able to set up a simple database system. Category B: Attributes for all-roundedness 1. Solve problems using systematic approaches.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to computers Introduction to information technology using Internet of Things as a real life example. Introduction to modern computing systems. 2. Computer Networks Introduction to computer networks (Client-Server Architecture). Study different internet applications (HTTP/FTP/DNS). Explain basic concepts on packet routing (Data Encapsulation/IP Addressing/Functions of Routers). Introduction to basic network security measures. 3. Introduction to data processing and information systems Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Introduction to Information systems. Workflow management. Case study: Database design, implementation and management.

Teaching/Learning Methodology

There will be a mix of lectures, tutorials, and laboratory sessions/workshops to facilitate effective learning. Students will be given case studies to understand and practice the usage of modern information systems.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		A1	A2	A3	A4	B1
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 A1, A2, A3, A4, and B1.

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, *Using Information Technology: A Practical Introduction to Computers and Communications*, 11th ed., McGraw-Hill, 2014.
2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 7th ed., Pearson, 2016.
3. D. E. Comer, *Computer Networks and Internets*, 6th ed., Pearson, 2015.
4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed., Tmh, 2010.
5. W. Stalling, *Data and Computer Communications*, 10th ed., Pearson, 2013.
6. S. Morris and C. Coronel, *Database Systems: Design, Implementation, and Management*, 11th Edition, Course Technology, 2014.
7. M. Mannino, *Database Design, Application Development, & Administration*. 6th ed., Chicago Business Press, 2014.

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 Learning Outcomes	Upon completion of the subject, students will be able to a. perform tasks in an organization related to organizing, planning, leading and controlling project and process activities; b. select appropriate management techniques for improving organizational structures, work procedures, and quality performance of operational tasks; c. analyze the factors that affect changes in the work environment, and be aware of the approaches in implementing change in an organization; d. be aware of the imperatives of ethical and business behaviors in engineering organizations in a fast-changing business environment.
Subject Synopsis/Indicative Syllabus	1. <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. Management of Change

Change leadership; Organizational change; Phases of planned change; Stress management; Factors that affect the execution of change

5. Effects of Environmental Factors

The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues

Teaching/Learning Methodology

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

The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related and applied in real life situations.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d		
1. Coursework • Group learning activities (10%) • Presentation (individual) (30%)	40%	✓	✓	✓	✓		
2. Final examination	60%	✓	✓	✓	✓		
Total	100%						

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

The coursework of this subject involves students working in groups to study cases that reflect the realities of management situations in an engineering setting. Through such exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their written reports on these case studies. A written final examination is also designed to assess the intended learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lectures and review	27 Hrs.
	▪ Tutorials and presentations	12 Hrs.
	Other student study effort:	
	▪ Research and preparation	30 Hrs.
	▪ Report writing	10 Hrs.
	▪ Preparation for oral presentation and examination	37 Hrs.
	Total student study effort	116 Hrs.
Reading List and References	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	

(revised) July 2015

Subject offered by
Department of Electronic and Information Engineering

Subject Description Form

Subject Code	EIE2302 (for AP and ISE)
Subject Title	Electricity and Electronics
Credit Value	3
Level	2
Pre-requisite	Nil
Co-requisite/ Exclusion	Nil
Objectives	1. Introduce the fundamental concepts of operation of electric circuits applicable to engineering students. 2. Develop ability for solving problems involving electric circuits. 3. Understand the function and application of basic electronic devices. 4. Develop skills for experimentation on electric circuits. 5. Impart relevant skills and knowledge in basic electricity and electronics 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:** Category A: Professional/academic knowledge and skills 1. Understand the operating principles of some fundamental electric circuits. 2. Solve simple problems in electric circuits. 3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations. 4. Understand the basic function and application of some basic electronic devices.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. DC circuits - Introduction to electric circuits. Potential and potential difference. Current. Resistance. Ohm's law. Kirchhoff laws. Voltage divider, current divider, series and parallel circuits. Node Voltage and Mesh Current Analyses. Thévenin and Norton Equivalents, Wheatstone bridge. Power dissipation and maximum power transfer. 2. Basic AC elements and simple AC circuits. 3. Electrical machines and protection - Generators. Motors. Mutual inductance and transformer. Circuit breakers. Motor selection. 4. Basic electronic devices - Junction diodes, bipolar junction transistors, field-effect transistors and their applications in simple mechatronics. 5. Applications of electronic devices – Solid state relays. ADC. Display drivers. Motor controllers, Power supplies. Frequency converters. **Laboratory Experiments:** 1. Introduction to laboratory instrumentation / Thévenin and Norton theorems 2. Voltage regulators 3. Transformer tests and characteristics.

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 *knowledge* of the subject, and *comprehension* is strengthened with interactive Q&A.
Tutorials, where problems are discussed and are given to students for them to solve	1, 2, 4	In tutorials, students *apply* 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 *acquire* hands-on experience in using electronic equipment and *apply* 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 *comprehension* of the *knowledge* 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 *knowledge* and *comprehension*. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them 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.
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	26 Hours
▪ Tutorial	4 Hours
▪ Laboratory	9 Hours
Other student study effort:	
▪ Revision	36 Hours
▪ Tutorial and Assignments	21 Hours
▪ Log book and Report Writing	9 Hours
Total student study effort:	**105 Hours**

Reading List and References

Textbooks:

1. G. Rizzoni, *Fundamentals of Electrical Engineering*, 1st ed., McGraw-Hill, 2009.
2. A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, 6th ed., Oxford University Press, 2009.

References:

1. R.L. Boylestad and L. Nashelsky, *Electronic Devices and Circuit Theory*, 10th ed.,

	Prentice Hall, 2008. 2. R.C. Jaeger and T.N. Blalock, *Microelectronic Circuit Design*, 4th ed., McGraw Hill, 2010. 3. C.K. Tse, *Linear Circuit Analysis,* London: Addison-Wesley, 1998. 4. D.A. Neamen, *Microelectronics: Circuit Analysis and Design*, 4th ed., McGraw Hill, 2009. 5. R.A. DeCarlo and P.M. Lin, *Linear Circuit Analysis*, 2nd ed., Oxford University Press, 2001. 6. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 4th ed., 2006.
Last Updated	June 2014
Prepared by	Dr Y.M. Lai

Subjects offered by Industrial Centre

Subject Description Form

Subject Code	IC2122
Subject Title	Control and Automation
Credit Value	3 Academic Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with 1. The necessary skills and principles which underpin a range of automation systems for industrial application. 2. The knowledge of the control and input/output devices in an automation system including sensors, transducers, actuators, controllers and vision systems and their applications in industry; 3. The control concepts used in automation systems with the emphasis on system design and integration. 4. The key concepts of manufacturing systems integration.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify the technology options for automating manufacturing process b. apply the knowledge, skills, and modern engineering tools for industrial system control; c. select and integrate appropriate components and/or functional modules to perform specify automation tasks.

Subject Synopsis/ Indicative Syllabus	1. Overview of Industrial Automation Need for automation, Automation Development; Examples of automation systems 2. Sensors and interfacing Industrial sensors, digital and analog sensors and Machine vision; 3. Actuators and Mechanisms Electrical actuators and associate control, mechanical power transmission elements and Fluid power actuators; 4. Architecture of intelligent machines Control system design classification, Programmable controllers and HMI design, industrial networking; 5. Application of numerical controlled machines and Industrial Robot Numerical control systems; programming methods and languages; Robot configurations, Robot Kinematics and control; 6. System Integration Organization of integrated manufacturing system and flexible manufacturing methods.
Learning Methodology	Lectures will emphasize the concepts and applications of the principles and key issues, using an interactive approach. Tutorials are given to clarify issues may arise from the lectures. Laboratories and hands-on practices will be conducted in order to consolidate the concepts.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed		
		a	b	c
Laboratory Exercise	30		✓	✓
Tutorial	10	✓	✓	
Examination	60	✓	✓	✓
Total	100			

Student Study Effort Required

Class Contact	
▪ Lecture/Seminar	18 Hrs.
▪ Tutorial	2 Hrs.
▪ Laboratory	18 Hrs.
Other Study Effort	
▪ Preparation Work on report/tutorial	50 Hrs.
▪ Self Study	30 Hrs.
Total Study Effort	**118 Hrs.**

Reading List and References	1. G. Boothroyd, *Assembly Automation and Product Design*, Second Edition (Manufacturing Engineering and Materials Processing), CRC Press, 2005 2. M. Groover, *Automation, Production Systems, and Computer-Integrated Manufacturing (3rd Edition)*, Pearson/Prentice Hall, 2008 3. J. Hooper, *Basic pneumatics : an introduction to industrial compressed air systems and components*, Carolina Academic Press, 2003 4. L. Krivts, *Pneumatic actuating systems for automatic equipment: structure and design*, CRC Press Taylor & Francis Group, 2006 5. John S. Cundiff, *Fluid power circuits and controls : fundamentals and applications*, CRC Press, 2002 6. T. Kissell, *Industrial electronics: applications for programmable controllers, instrumentation and process control*, Prentice Hall, 2003 7. James A. Rehg, Glenn J. Sartori., *Programmable logic controllers*, Prentice Hall, 2009 8. F. Frank *Embedded system design: a unified hardware/software introduction*, John Wiley & Sons, 2002 9. *Marks' Standard Handbook for Mechanical Engineers (2007)*, 11th edition, New York, McGraw-Hill 10. Ronald A. Walsh, *Electromechanical design handbook*, McGraw-Hill, 2000.

Subject Description Form

Subject Code	IC2123
Subject Title	Design and Manufacturing Group Project
Credit Value	6 Academic Credits
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	While the specific objectives of individual projects may vary from one project to another, students are expected to develop the following generic skills through the learning experience of working on an individual project under the guidance of a supervisor: 1. Skills to obtain the required information to formulate a problem, and to devise and implement strategies in order to produce a solution; 2. Skills to apply knowledge and procedures (principles, techniques, and methods) and to understand their limitations in problem identification, data analysis, and formulation of logical observations and/or solutions; 3. Skills to work effectively as an individual using one's initiative and within constraints; 4. Skills to prepare, present, and defend a project report effectively.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Communicate, cooperate, and collaborate as a team member, as well as identify individual efforts of group members. *(Objective 3 and Syllabus 1-3). Category B;* b) Obtain information in formulating a problem, including gaining the required skills necessary in data collection, as a means of devising and implementing strategies during problem-solving. *(Objective 1-2 and Syllabus 1-3). Category A;* c) Apply knowledge and procedures, and understand their limitations. *(Objective 2 and Syllabus 1-3). Category A; and* d) Prepare, present, and defend a clear, coherent, and concise report. *(Objective 4 and Syllabus 1-3). Category A.*
Subject Synopsis/ Indicative Syllabus	All projects assigned will be of "real" work basis proposed by supervisors. These projects are always having a real problem of interest to the clients which requires students to meet the expected demand. Students are required to work through the various project stages and study various aspects related to the students' field of study with guidance of supervisors.

<table>
<tr><td></td><td>Typical project contents are:

1. Study on Product / Process Design and Improvement

2. Study on Warehousing, Inventory Management and Supply Chain Management

3. Study on Production Operations and Process

Students should note that the scope of the assignment will depend on the nature of the project proposed by supervisors. It is likely that not all activities listed above are to be undertaken in a project.</td></tr>
<tr><td>Learning Methodology</td><td>Throughout the duration of the project, the supervisor provides guidance and monitors the progress of the projects. The project-based learning approach is recommended for adoption. It is a systematic teaching method engaging students to learn the essential knowledge and life-enhancing skills through extended and student-influenced inquiry process, which are structured around complex and real problems.

1. The project is a detailed study of various aspects related to the students' field of study. Normally, students work in groups of three to four members. They have to apply all the knowledge learned through group projects or by self-learning.

2. Throughout the project duration, project supervisors are expected to discuss with their students through meetings, which can be arranged based on mutually convenient schedules. The supervisors shall provide guidance and monitor the progress of the projects.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Assessment Methods</th><th rowspan="2">Weighting (%)</th><th colspan="4">Intended Learning Outcomes Assessed</th></tr>
<tr><th>a</th><th>b</th><th>c</th><th>d</th></tr>
<tr><td>1. Project Progress</td><td>20</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Oral Presentation</td><td>30</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Written Report</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>
Students shall be assessed individually to reflect the student's performance.

Project Progress is to assess students' insight, communication and execution of a project during the project period.

Oral Presentation allows students to demonstrate their ability in presenting their project clearly and logically including the project objectives, their approach to solve the problem and the deliverable of their project.

Written Report is to facilitate students to review and sum up the activities and processes of the project holistically. Assessment of the report will focus on the adequacy of the technical content, clarity and fluency of the</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">presentation, discussion, and recommendation.

The second and the third components are jointly assessed by two co-examiners and the project supervisor.</td></tr>
<tr><td rowspan="8">Student Study Effort Required</td><td colspan="2">Class Contact</td></tr>
<tr><td>▪ Briefing Session</td><td>2 Hrs.</td></tr>
<tr><td>▪ Oral Presentation</td><td>1 Hr.</td></tr>
<tr><td>▪ Meetings (with project team, supervisor or any project stakeholders) for total 13 sessions</td><td>39 Hrs.</td></tr>
<tr><td colspan="2">Other Study Effort</td></tr>
<tr><td>▪ Literature Review/Fieldwork/Experiment</td><td>135 Hrs.</td></tr>
<tr><td>▪ Analysis/Written Report</td><td>60 Hrs.</td></tr>
<tr><td>Total Study Effort</td><td>237 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">1) Blaxter, L, et al, How to Research, 2nd edn, Open University Press, England, 2001

2) Bryman, A, Research Methods and Organization Studies, Unwin Hyman, Boston, 1989

3) Murray, R, How to Write a Thesis, 2nd edn, Open University Press, England, 2006

4) Slade, C., et al., Form and Style: Research Papers, Reports, Thesis, 9th edn, Houghton Mifflin, Boston, 1994</td></tr>
</table>

SECTION 9 – INDUSTRIAL CENTRE TRAINING MODULES

The IC Training modules for the programme are listed below. Note that this list is not exhaustive and other modules may be developed to replace or supplement those listed. Such alterations are on-going and will be made in conjunction with the Departmental Undergraduate Programme Committee's assessment of current needs in conjunction with the Industrial Centre.

TABLE 9 - INDEX

Subject Description Form

Subject Code	IC2105
Subject Title	Engineering Communication and Fundamentals
Credit Value	4 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers a wide spectrum of fundamental engineering practice that are essential for a professional engineer. This subject includes Engineering Drawing and CAD, Industrial Safety and Electronic Product Safety Test and Practice, Basic Mechatronic Practice and Basic Scientific Computing that aims at providing fundamental and necessary technical skills to all year 1 students interested in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Describe the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems and electrical engineering; b) Interpret basic occupational health and industrial safety requirements for engineering practice; c) Explain common electronic product safety tests; d) Design and implement simple mechatronic systems with programmable controller, software, actuation devices, sensing devices and mechanism; and e) Apply scientific computing software for computing in science and engineering including visualization and programming;

Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. (TM8059) Engineering Drawing and CAD 1.1. Fundamentals of Engineering Drawing and CAD Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing. Introduction to CAD; features of 2D CAD system (layer; draw; modify; block & attributes; standard library); techniques for the creation of titleblock; setup of 2D plotting; general concepts on 3D computer modeling; parametric feature based solid modeling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list. 1.2. Electrical Drawing Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical and electronic device symbols and layout, architectural wiring diagram with reference to the architectural symbols for electrical drawings in Hong Kong and international standards. 2. (TM2009) Industrial Safety 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. (TM1116) Electronic Product Safety Test and Practice 3.1. Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signal sources; 3.2. Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test. 4. (TM0510) Basic Mechatronic Practice 4.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces. 4.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design. **One of the followings as decided by hosting programme** 5. (TM3014) Basic Scientific Computing with MATLAB 5.1. Overview to scientific computering; introduction to MATLAB; interactive calculations, random number generators, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting, file I/O functions. Basic 2D and 3D plots. 5.2. M-file programming & debugging; scripts, functions, logic operations, flow control, introduction to graphical user interface. 6. (TM3300) Basic Scientific Computing with Python 6.1. Basic data structures and data operations; script programming and debugging; logic operations, flow control and graphical user interfaces. 6.2. Use of functions and popular Python packages, such as Numpy,

	Panda and Matplotlib. 6.3. Data visualization by using graphics packages; such as basic plotting, formatting, 2D and 3D plots and modifying colormap.
Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students' in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
		a	b	c	d	e
Continuous Assessment						
1. Assignment / Project	Refer to individual Module Description Form	✓	✓	✓	✓	✓
2. Test			✓		✓	✓
3. Report / Logbook				✓	✓	
Total	100					

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

Student Study Effort Expected

Class Contact	**TM8059**	**TM2009**	**TM1116**	**TM0510**	**TM3014 or TM3300**
▪ Mini-lecture	11 Hrs.	7 Hrs.	2 Hrs.	6 Hrs.	6 Hrs.
▪ In-class Assignment/ Hands-on Practice	40 Hrs.	8 Hrs.	4 Hrs.	21 Hrs.	15 Hrs.

	Other Study Effort	
	▪ Nil	
	Total Study Effort	**120 Hrs.**

Reading List and References	**Reference Software List:** 1. AutoCAD from Autodesk Inc. 2. SolidWorks from Dassault Systèmes Solidworks Corp. 3. MATLAB from The Mathworks Inc. 4. Python from Python Software Foundation **Reference Standards and Handbooks:** 1. BS8888 Technical Product Specification (TPS) Specification. 2. Cecil H. Jensen, et al, Engineering Drawing and Design, McGraw-Hill, 2008. 3. Warrendale, SAE fastener standards manual, Society of Automotive Engineers, 1997. 4. Timothy H Wentzell, et al, Machine Design, Delmar Learning, 2004. 5. Czernik, Daniel, Gaskets: Design, Selection, and Testing, McGraw-Hill, 1995. 6. Michael M. Khonsari, E. Richard Booser, Applied Tribology: Bearing Design and Lubrication, Wiley-Interscience, 2001. 7. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams. 8. IEC 61082 Preparation of Documents used in Electrotechnology. **Reference Books:** Training material, manual and articles published by Industrial Centre.

Subject Description Form

Subject Code	IC2127
Subject Title	Computer Proficiency Training
Credit Value	2 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers the application of software in computer-aided statistical analysis and project planning that aims at providing the necessary fundamental knowledge and computer skills to students.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Acquire a certain level of understanding and practical skill in using specific software in assisting their future study and professional *(Objective 1 and Syllabus Item 1-2). Category A*.
Subject Synopsis/ Indicative Syllabus	1) TM3006 - Project Planning and Business Documentation Project management concepts, project documentation, project management practice, business process documentation. 2) TM3015 - Basic Computer-aided Statistical Analysis Introduction to SPSS, data collection, questionnaire design, variables and reverse coding, descriptive statistics; non-normality handling, grouping, randomisation and transformation; bivariate statistics, confidence intervals and effect size; factor analysis, reliability analysis with measured and latent variables; simple and multiple linear regression, goodness-of-fit and multicollinearity; One-way and two-way ANOVA, F-ratio and planned comparison; visualising and reporting statistics with histograms, box-plots, line charts, scatter-plots.
Learning Methodology	Please refer to the individual Module Descriptions of TM3006 and TM3015 for details.

Assessment Methods in Alignment with Intended Learning Outcomes	Please refer to the individual Module Descriptions of TM3006 and TM3015 for details.

Student Study Effort Required	**Class Contact**	
	▪ Computer Training	60 Hrs.
	Total Study Effort	**60 Hrs.**
Reading List and References	Please refer to the individual module descriptions of TM3006 and TM3015 for details.	

Subject Description Form

Subject Code	IC2170
Subject Title	Appreciation of Manufacturing Processes and Metrology
Credit Value	4 Training Credits
Level	2
Pre-requisite	IC2105
Objectives	This subject aims at developing student's knowledge on technologies applied in the product development workflow through an integrated application-oriented learning. The practical use of principles, operation of different manufacturing processes, measuring techniques and application of common materials will be involved. It can enhance student's recognition of the working principle, process capability (e.g. accuracy, limitations) and application in order to strengthen students' engineering competence.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) identify working principle and capability of different manufacturing technologies. b) apply proper measuring techniques in different manufacturing processes c) justify appropriate manufacturing processes for specific product requirements. d) collaboratively execute an application oriented training through group work and discussions and inspires oneself to learn continuously about current industrial technologies

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>The extent of the training will depend on the nature of the product that students work on, not all listed activities in Item 3 are likely to be undertaken for all projects.
1. Application and Selection of Engineering Materials
2. Application and Selection of Manufacturing Metrology
3. Application and Operation of
▪ Common Manufacturing Processes for Metal Parts (Casting)
▪ Common Manufacturing Processes for Plastic Parts (Injection Moulding and Rapid tooling)
▪ Common Manufacturing Processes for PCBA
▪ Processes for Surface Treatment
▪ Operation of Common Joining Processes (Sheet Metal and Welding)
▪ Operation of Computer-Aided Systems
▪ Rapid Prototyping and Production Technologies
▪ Reverse Engineering</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Short lectures introduce the principle of different manufacturing processes and their applications.
Demonstrations provide students with understanding on the operation procedures of processes involved in the training.
Hands-on activities will be used for students to apply the working principles that learned in the training.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">Weighting (%)</th><th colspan="4">Intended Learning Outcomes to be assessed</th></tr>
<tr><th>a</th><th>b</th><th>c</th><th>d</th></tr>
<tr><td>1. Assignment</td><td>50</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Product Assembly</td><td>10</td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>3. Individual Report</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100</td><td colspan="3"></td><td></td></tr>
</table>
The assignment is designed to facilitate students to reflect and apply the</td></tr>
</table>

	knowledge periodically throughout the class. Product Assembly is designed to facilitate students to show their group performances, collaboration and problem solving capability. Written report is designed to facilitate students to show the recognition and their reflection to the training.	
Student Study Effort Expected	**Class Contact**	
	Short lectures, Demonstrations , Hands-on Practices and Presentation	120 Hrs.
	Other Study Effort	**0 Hrs.**
	Total Student Study Effort	**120 Hrs.**
Reading List and References	Reading Materials published by Industrial Centre	

Appendix I

GENERAL UNIVERSITY REQUIREMENTS FOR HIGHER DIPLOMA PROGRAMMES

General University Requirements for Higher Diploma Programmes (HDGUR)

(a)	HD Language and Communication Requirements (HDLCR) [9 credits: 6 credits in English and 3 credits in Chinese]	9 credits
(b)	Cluster Areas Requirement (CAR) [6 credits: 3 credits should be in subjects designed as "China-related"]	6 credits
	Total =	***15 credits***

(a) Language and Communication Requirements for Higher Diploma Programmes (HDLCR)

Chinese and English language subjects which are purposely designed to serve the learning and articulation needs of HD students will be offered to the admittees of 2013/14 and thereafter. These degree-equivalent HDLCR subjects will be offered to HD students entering PolyU with HKDSE Level 2 in English and Chinese Language. Students with HKDSE Level 3 or above in the English and Chinese Language (irrespective of their sub-score attainments) will take LCR subjects at the Bachelor's degree level according to their level of language proficiency at entry. Students admitted to articulation degree programmes or senior year intakes would be considered for credit transfer based on their academic performance.

Degree-equivalent HDLCR subjects
ELC1007 University English for Higher Diploma Students I (3 credits)
ELC1008 University English for Higher Diploma Students II (3 credits)
CLC1105C/P University Chinese for Higher Diploma Students (3 credits)

(b) 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 two 3-credit subjects in any 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

China Studies Requirement

Of the 6 credits of CAR described in (b) 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