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

Part 1: General Information

1.1 Introduction

1.1.1 Programme Title

BEng (Hons) Scheme in Integrated Product Development (IPD) [Scheme Code: 05403]

1.1.2 Award Title

There are two awards operating under the IPD Scheme:

- BEng (Hons) in Product Analysis and Engineering Design (PAED) [JUPAS Programme Code: JS3428]

- BEng (Hons) in Product Engineering with Marketing (PEM) [JUPAS Programme Code: JS3404]

Students are admitted into one of the above two awards. After the common first and second years, they can apply for transfer of study to another award, subject to conditions including quota constraint, academic performance and interview performance.

1.1.3 Mode of Attendance

Full-time

1.1.4 Normal and Maximum Periods of Registration

Normal and maximum periods of registration for the scheme are presented in Table 1-1:

Table 1-1 Normal and Maximum Periods of Registration

Mode of Studies	Normal Duration of Studies	Maximum Period of Registration
Full-time	4 Years	8 Years

1.1.5 Total Credit Requirements for Graduation

There are 124 academic credits required for graduation and their details of their graduation requirements are presented in Section 2.11. In addition, students are required to complete 10 IC practical training credits and the Work-Integrated Education (WIE) credits mandated by The Hong Kong Polytechnic University (PolyU). IC training credits and WIE credits are not included in the 124 academic credits.

1.2 Host and Contributing Departments

The IPD Scheme is hosted by the Faculty of Engineering (FENG). The two awards operated under the scheme are hosted by:

- BEng (Hons) in Product Analysis and Engineering Design (PAED) – Department of Mechanical Engineering (ME)

- BEng (Hons) in Product Engineering with Marketing (PEM) – Department of Industrial and Systems Engineering (ISE)

This multi-disciplinary scheme integrates the strengths of ME, ISE, School of Design (SD), Department of Management and Marketing (MM), Department of Applied Physics (AP) and Industrial Centre (IC) to form a critical mass, making PolyU the preferred university to study integrated product development in the region.

1.3 Type and Level of Award

Successful launching of a new product to market requires the full integration of knowledge and technology related to product design and development: industrial design; engineering design and production design. Certainly, knowledge about the market and the use of appropriate marketing techniques are also important factors for the launching to be successful. Judging from the depth and width of the inter-disciplinary knowledge and skills required by the graduates, the scheme is provided at the honours degree level. In addition, because of the emphasis in application of engineering and management sciences to product design and development, the "BEng (Hons)" award deems most appropriate.

1.4 Mode of Study

The scheme curriculum that can be completed in the full-time mode within a normal duration of 8 semesters (equivalent to 4 years) is presented in Section 2.11.

1.5 Entrance Requirements

In addition to the general requirements for admissions to the honours degree programmes of the University, students applying for the IPD Scheme need to satisfy one of the following requirements ((a), (b) or (c)):

(a) Entry with HKDSE Qualifications:

General Entrance Requirements
4 core subjects and 1 elective subject with:
Level 3 – English Language and Chinese Language
Level 2 – Mathematics, Liberal Studies and one elective subject

Preferred Subjects
Preferred elective subject(s) for PEM – Physics, Biology, Chemistry, Combined Science or Information & Communication Technology;
Preferred elective subject(s) for PAED – Physics, Biology, Chemistry, Combined Science or Information & Communication Technology, Extended Modules of Mathematics

Flexibilities

1. Alternative Chinese will be accepted as meeting the Chinese Language requirement for those students who fulfill the requirement for taking Alternative Chinese as announced by EDB. Language related disciplines may require a higher grade for Alternative Chinese.
2. Other language subjects will be accepted as elective subjects. The minimum requirement is Grade E.
3. While relevant Applied Learning (ApL) subjects will be accepted as meeting the elective subject requirement, attainment at distinction level in those subjects will be required (PEM only)
4. Students not meeting the level requirement of the elective subject may be specially considered if they have attained Level 2 in one of the extended modules of Mathematics.

(b) Alternative Entry Route with Possible Credit Transfer:

In addition to satisfying the University general requirements for non-HKDSE admissions, sufficient backgrounds in mathematics, physics, engineering sciences, and language will be required. Students admitted via this category may apply for credit transfer in some subjects which will be considered on the basis of relevance and performance.

(c) Equivalent Qualifications:

The applicants should have qualifications equivalent to (a) or (b).

Part 2: Curriculum Design

2.1 Preamble

In order for Hong Kong to remain competitive in the export-led market, our industries need to switch their role from a low cost Original Equipment Manufacturer (OEM) to a high value-added Original Design Manufacturer (ODM), and then to an Original Brand Manufacturer (OBM) to maximize the profit margin. It is in particular important for them to have their own brand name of top quality products, much like the designer label of other well-developed countries, to maintain a strong competition in the international market. In order to achieve that, heavy emphasis should be placed on the added-value of products, which implies an increasingly urgent need for inter-disciplinary expertise of high-end product design and development.

Because of the huge demand of professionals to design and develop quality new products, there are currently some academic programmes offered in Hong Kong at various levels, with the main objective to produce graduates who are able to support the development and growth of this discipline. After assessing these programmes closely, ME and ISE identify an urgent need as well as an excellent opportunity for the PolyU to develop an inter-disciplinary IPD Scheme. On the one hand to support the PolyU's niche area in product design and development, and on the other hand, to produce all-round graduates to lead and support smooth operation and healthy growth of the discipline.

2.2 University Mission of PolyU

The Hong Kong Polytechnic University aspires to be a leading university that excels in professional education, applied research and partnership for the betterment of Hong Kong, the nation and the world. The PolyU's mission is stated as below:

I. To nurture graduates who are critical thinkers, effective communicators, innovative problem solvers, lifelong learners and ethical leaders.
II. To advance knowledge and the frontiers of technology to meet the changing needs of society.
III. To support a University community in which all members can excel through education and scholarship.

2.3 Aims and Characteristics of the IPD Scheme

The IPD scheme aims to strengthen the PolyU's strategic niche area in product design and development. It is developed with the aims to align with the PolyU's endeavour to groom expertise for Hong Kong and the Pearl River Delta region, to expedite technology transfer and to make concrete contributions to the integrated product development discipline. The scheme's aims are achieved by nurturing a new breed of all-round product development professionals to support and even lead the continuing growth in prosperity of the manufacturing industry in the region.

It is also developed to spearhead the PolyU's foresight in developing inter-disciplinary academic programmes to better serve the community. The IPD scheme integrates the strengths of several departments to form a critical mass in making PolyU the preferred university in studying integrated product development in the region. Certainly, it is expected to become the most preferred undergraduate degree programme for the students who wish to develop their career as leading professionals in this discipline, and most essential in adding to the excellence of the University in the discipline of product design and development.

The IPD scheme is unique in Hong Kong and the Pearl River Delta region due to the following characteristics:

- **Synergize Technology with Design and Business**

  PolyU plays very significant role in facilitating Hong Kong to become the design hub of Asia by launching academic programmes in product design and development. One of the two integral parts, product development, is strongly supported by the IPD Scheme.

  In the development of the curriculum, a broad knowledge-base integrating with appropriate practical training is provided as the essential core for the students to master the state-of-the-art technology in developing quality products. Knowledge, techniques and skills in design (including industrial design) and business (including marketing) are also provided at the appropriate level to facilitate their full integration with technology.

  Thus, graduates of the scheme can be innovative, knowledgeable and skillful to synergize product development with design and business in developing top quality new products to better serve the industry.

- **Inter-disciplinary Collaboration**

  The IPD scheme spearheads to implement the University's excellent intention to promote inter-disciplinary collaboration between faculties/departments in the development and implementation of academic programmes. In the development of the curriculum, the two co-host departments, ME and ISE, have encouraged all the departments involved (SD, IC, MM and AP) to develop and contribute the most relevant subjects to the scheme.

  Through an open and constructive mechanism, the departments involved are able to make their best contributions towards the scheme, instead of being given certain jobs essentially pre-determined by the two co-host departments.

  By encouraging collaborations, the IPD scheme is facilitated by extensive resources and expertise from all of the departments involved, for example, the most up-to-date CAID/CAD/CAE/CAM/Virtual-manufacturing software of ME and ISE, the advanced prototyping facilities of ISE and IC, and the state-of-the-art laboratories of ME, ISE, SD and AP.

- **Outcome-Based-Approach**

  The curriculum is developed and implemented with the Outcome-Based-approach (OBA). In this approach, Intended Learning Outcomes (ILOs) of the two awards operating under the IPD scheme (PAED and PEM) are first identified, which will be fully fulfilled by the curriculum built upon a combination of most suitable subjects. These subjects should be implemented through the most appropriate teaching and learning approaches. Details of the Outcome-Based-Approach in offering the IPD Scheme are explained in the following Section 2.4.

- **All-round Graduates in Integrated Product Development with Preferred Specialization**

  In order for our graduates to be preferred by the employers, they must be immediately found useful but at the same time, able to develop themselves to play leading roles in the

discipline of product design and development. *In order to develop such all-roundedness for the graduates, a very well balance and integration between education and training is required.*

Thus, a broad knowledge-base consisting of engineering sciences, applied computer sciences and advanced technologies, together with certain important techniques and skills including communication and presentation, team-playing, management and self-learning is provided. The subjects, both core and elective, offered in the IPD scheme are developed to form a coherent curriculum with an emphasis on integration with a well-balanced manner. In addition, hands-on experience of the development of top quality new products is also provided to the students. The IC practical training, the projects mandated in every year of the study, and the WIE requirement are also important elements to fulfil this objective.

- **Development of two integrated awards to meet different student needs**

Another distinctive characteristic of the IPD scheme is the development of the two integrated awards (PAED and PEM) to meet different student needs. On the one hand, it provides sufficient common core subjects in the first two semesters for the students to build a solid and broad background on product design and development. On the other hand, making use of the last four semesters provides enough flexibility for them to develop their more preferred expertise: Product Analysis and Engineering Design or Product Engineering with Marketing.

2.3.1 Intended Learning Outcomes (ILO) of the IPD Scheme

Based on the specific aims and characteristics of the IPD Scheme, the following intended learning outcomes are developed:

1. In order to support the University's strategic niche area of product design, graduates of the IPD Scheme should be able to integrate technology with design and business, and apply to the areas of product design and development.

2. Graduates of the IPD Scheme should have acquired an excellent integration of knowledge, techniques, skills and hands-on experience in the designing and developing of quality new products and their launching to market.

3. Graduates of the IPD Scheme should have developed all the desired professional skills including self-learning, communication, team-playing, management, literature search and global outlook, such that they are able to develop their careers as professional engineers in product design and development.

4. Graduates of the IPD Scheme should be able to develop an awareness of professional ethics and social responsibilities to the community in designing and developing new products.

5. Graduates of the IPD Scheme should be able to acquire professional recognition from professional bodies including the Hong Kong Institution of Engineers.

The Intended Learning Outcomes of the IPD Scheme are developed to support the PolyU's mission as shown in the following Table 2-1:

Table 2-1 Matching the ILOs of the IPD Scheme with University Mission

		UNIVERSITY MISSION		
		I	**II**	**III**
ILOs of the IPD SCHEME	**1**	X	X	X
	2	X	X	
	3	X	X	X
	4	X		X
	5	X	X	

Both the PAED and PEM Awards operating under the IPD Scheme provide also the part-time mode for mature learners and graduates of relevant sub-degree programmes to pursue life-long learning.

2.4 Aims and Intended Learning Outcomes of PAED and PEM Awards

The IPD scheme consists of two awards: namely PAED and PEM. The aims and intended learning outcomes developed by both awards are to fully satisfy the IPD scheme's aims and to achieve the IPD's intended learning outcomes, which are aligned with the PolyU's mission.

Even though sharing the same foundation of integrated product development, each award has slightly different focuses on the entire product design and development process therefore the aims and intended learning outcomes achieved by both awards are slightly different from each other.

2.4.1 Aims of PAED Award

In order to support the PolyU's mission and to fulfill the IPD scheme's aims, the PAED award is developed to achieve the following aims:

1. To synergize technology with design and business with an aim to fulfilling the PolyU's strategic development of product design.

2. To provide graduates with excellent integration of knowledge, skills and hands-on experience in developing new products with superior quality including engineering design, industrial design, engineering sciences, simulation and analysis, prototyping and manufacture, management and marketing, via a coherent and well-balanced curriculum developed through collaboration between departments involved.

3. To produce preferred all-round graduates, who have developed all-roundedness knowledge and skills including self-learning, communication, team-playing, management, information search and global outlook, such that they are found immediately useful by the industry, and at the same time, will be able to develop themselves to play important roles in leading the local manufacturers to design and develop high-value-added new products with superior quality, in order to maintain the prosperity of Hong Kong.

4. To help graduates develop the ability to engage in life-long-learning and professional development and to acquire professional recognition from professional bodies including the Hong Kong Institution of Engineers.

5. To produce graduates who are aware of the global, societal, ethical and professional issues in the practice of product design and development.

The aims of the BEng (Hons) in Product Analysis and Engineering Design are designed to support the PolyU's mission as shown in the following Table 2-2:

Table 2-2 Matching the Aims of PAED Award with University Mission

		UNIVERSITY MISSION		
		I	**II**	**III**
AIMS of PAED AWARD	**1**	X	X	
	2	X	X	
	3	X	X	X
	4	X		X
	5	X		X

2.4.2 Intended Learning Outcomes of PAED Award

Graduates will be expected to achieve the following twelve intended learning outcomes of the PAED award upon completing the award satisfactory. These intended learning outcomes can be classified into two groups and are presented as below:

(I) Professional/academic knowledge and skills (PAK)

(a) An ability to evaluate consumers' needs and market situation for a new product, and to identify and formulate a design problem by developing design specifications to achieve the planned goals.

(b) An ability to generate, evaluate and select design concepts with creative design thinking, awareness of business consideration and efficient information search.

(c) An ability to apply knowledge of arts, mathematics, sciences and engineering, via analytical, computational or experimental approaches, to analyze or predict the performance of a design in the life cycle of product development.

(d) An ability to assess the impacts of human factors, materials, manufacturing processes, environmental issues, product safety and quality in the design and development of quality products.

(e) An ability to apply state-of-the-art technology and computer/IT tools related to product development.

(f) An ability to appreciate the concept and trend in industrial design, and to identify market opportunity, and to understand the approach in generating new design concepts to meet the existing as well as potential market needs.

(g) An ability to apply project management technique to ensure successful completion of a product development process.

(II) Professional outlook and workplace skills (POW)

(a) A knowledge of contemporary issues and the broad education necessary to understand the impact of engineering design in a global and societal context.

(b) An ability to function professionally in a multidisciplinary design team as the leader or team member.

(c) An awareness of professional ethics and social responsibilities and the drive to achieve quality.

(d) An ability to communicate effectively and present fluently in English, Chinese and multi-media.

(e) Recognition of the need for and an ability to engage in life-long learning.

The intended learning outcomes of PAED award are supporting its five aims as indicated in the following Table 2-3:

Table 2-3 Matching the ILOs of PAED Award with its Aims

		ILOs OF PAED AWARD											
		PAKa	PAKb	PAKc	PAKd	PAKe	PAKf	PAKg	POWa	POWb	POWc	POWd	POWe
AIMS OF PAED AWARD	**1**	X	X	X	X	X	X		X				
	2	X	X	X	X	X	X	X	X	X		X	
	3		X		X	X		X	X	X		X	
	4					X			X		X		X
	5	X	X		X		X			X	X		

The Hong Kong Institution of Engineers (HKIE) adopts twelve desired learning outcomes for an engineering degree (Reference: Professional Accreditation Handbook (Engineering Degrees): Revised by Authority of the Accreditation Board of the HKIE, April 2011). A comparison between the desired learning outcomes for an engineering degree programme as proposed by the HKIE and the intended learning outcomes of PAED Award is given in the following Table 2-4:

Table 2-4 Matching Desired Learning Outcomes Proposed by HKIE and ILOs of the PAED Award

Learning Outcomes	Definition of Desired Learning Outcomes Proposed by HKIE	ILOs of PAED AWARD
1	An ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline	PAKc; PAKd
2	An ability to design and conduct experiments, as well as to analyze and interpret data	PAKc
3	An ability to design a system, component, or process, to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability	PAKa; PAKb; PAKc; PAKe
4	An ability to function on multi-disciplinary teams	POWb
5	An ability to identify, formulate, and solve engineering problems	PAKa; PAKc
6	An ability to understand professional and ethical responsibility	POWc
7	An ability to communicate effectively	POWd
8	An ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public	POWa
9	An ability to stay abreast of contemporary issues	POWa
10	An ability to recognize the need for, and to engage in life-long learning	POWe
11	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline	PAKc; PAKe
12	An ability to use the computer/IT tools relevant to the discipline with an understanding of their processes and limitations	PAKe

In addition to the desired programme learning outcomes as proposed by the HKIE, the PAED award proposes two additional intended learning outcomes as shown in the following Table 2-5:

Table 2-5 ILOs Proposed by PAED Award in Addition to Those of HKIE

Additional ILOs of PAED	Description of Additional Intended Learning Outcomes Proposed by PAED
PAKf	An ability to appreciate the concept and trend in industrial design, and to identify market opportunity, and to understand the approach in generating new design concepts to meet the existing as well as potential market needs
PAKg	An ability to apply project management technique to ensure successful completion of a product development process

2.4.3 Rationale and Aims of PEM Award

Product Engineering is concerned with the studies of product conception and specifications, technical design, design for product lifecycle, prototyping, materials and manufacturing processes, mould and die design, process design, quality assurance as well as outsourcing and their implications to a new product to be developed in terms of time-to-market, cost, environmental friendliness and quality. Marketing is concerned with attracting new customers by promising superior value and keeping and growing current customers by delivering satisfaction. The PEM award provides students with integrated education at honours degree level to enable them to develop into competent professionals in new product development. On completion of the PEM award, students are expected to:

1. have knowledge and understanding needed to perform duties of product development, in particular, the areas of product engineering and marketing;

2. demonstrate the ability to identify and solve product 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 an awareness of professional ethics and social responsibilities to the community at large;

5. 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.

Relationship between the PolyU's mission and the above aims of PEM award is presented in Table 2-6:

Table 2-6 Relationship between the Aims of PEM Award with University Mission

		UNIVERSITY MISSION		
		I	**II**	**III**
AIMS OF PEM AWARD	**1**	X	X	X
	2	X	X	
	3	X	X	X
	4	X	X	
	5	X	X	X

2.4.4 Intended Learning Outcomes of PEM Award

The intended learning outcomes of the PEM award, as listed below, are aligned with the aims of the award as specified above, as well as the HKIE programme outcomes.

1. To be versed in the activities of various engineering disciplines, and in particular, product engineering and marketing so as to be able to appreciate and interact with other professionals during execution of their duties situation. (Item 1 of 2.4.3 above).

2. To be able to apply knowledge, procedures (principles, techniques and methods), of engineering and, where appropriate, mathematics and science, to product engineering problems, and to have sufficient understanding of their limitations so that they can select the most appropriate for a particular situation. (Item 2 of 2.4.3 above).

3. To have gained some experience and developed the ability in analyzing the market situation and competition environment, identifying market needs and converting them into new product that satisfy customer needs. (Item 3 of 2.4.3 above).

4. To be able to communicate (oral, written, graphical and numerate) effectively. (Item 2 of item 2.4.3 above).

5. To be able to effectively work individually on their own initiative, and as members of a team (Item 4 of 2.4.3 above).

6. To be aware of the responsibilities and ethics of professional engineers in the modern world and recognize the constraints imposed on the organizations by economic and environmental factors. (Item 5 of 2.4.3 above).

7. To possess the ability to engage in life-long learning. (Item 5 of 2.4.3 above).

Relationship between aims and intended learning outcomes of the PEM award is shown in Table 2-7:

Table 2-7 Mapping the ILOs of PEM Award with its Aims

		ILOs OF PEM AWARD						
		1	**2**	**3**	**4**	**5**	**6**	**7**
AIMS OF PEM AWARD	**1**	X						
	2		X	X		X		
	3				X			
	4						X	
	5							X

Comparison is made between the intended learning outcomes of the PEM award and the learning outcomes as proposed by the HKIE for an engineering degree, and is presented in Table 2-8:

Table 2-8 Comparison between the Stated Intended Learning Outcomes of the PEM Award and the HKIE Required Outcomes

HKIE Criteria	HKIE Required outcomes of an engineering programme	ILOs of the PEM Award
a	An ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline	1
b	An ability to design and conduct experiments, as well as to analyse and interpret data	3
c	An ability to design a system, component or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2, 3
d	An ability to function on multidisciplinary teams	5
e	An ability to identify, formulate, and solve engineering problems	2, 5
f	An ability to understand of professional and ethical responsibility	6
g	An ability to communicate effectively	4
h	An ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public	6
i	An ability to stay abreast of contemporary issues	7
j	An ability to recognize the need for, and to engage in life-long learning	7
k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline	1
l	An ability to use the computer/IT tools relevant to the discipline with an understanding of their processes and limitations	2
	None HKIE required outcome An ability in analyzing the market situation and competition environment, identifying market needs	3

2.5 Institutional Learning Outcomes

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

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

2. **Critical thinker**: Graduates should be able to examine and critique the validity of information, arguments, and different viewpoints, and reach a sound judgment on the basis of credible evidence and logical reasoning.

3. **Effective communicator**: Graduates should be able to comprehend and communicate effectively in English and Chinese, orally and in writing, in professional and daily contexts.

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

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

6. **Ethical leader**: Graduates should have an understanding of leadership and be prepared to lead a team, and should acknowledge their responsibilities as professionals and citizens to society and their own nation, and be able to demonstrate ethical reasoning in professional and daily contexts.

Table 2-9 and Table 2-10 illustrate the relationship between Intended Learning Outcomes of PAED and PEM awards and Institutional Learning Outcomes.

Table 2-9 Relationship between the Intended Learning Outcomes of the PAED Award and the Institutional Learning Outcomes

PAED	**Institutional Learning Outcomes**					
PROGRAMME OUTCOMES	1	2	3	4	5	6
PAK (a)	X	X				
PAK (b)	X	X		X		
PAK (c)		X		X	X	
PAK (d)		X			X	X
PAK (e)	X		X		X	
PAK (f)		X		X	X	X
PAK (g)				X	X	
POW (a)	X	X		X		
POW (b)			X		X	X
POW (c)						X
POW (d)			X			
POW (e)					X	

Table 2-10 Relationship between the Intended Learning Outcomes of PEM award and Institutional Learning Outcomes:

PEM	**Institutional Learning Outcomes**					
PROGRAMME OUTCOMES	1	2	3	4	5	6
1	X					
2	X	X				
3				X		
4			X			
5			X			
6						X
7					X	

2.6 General Approach to Teaching, Learning and Assessment

The specific learning outcomes expected to be achieved by a subject should be spelt out explicitly in its syllabus. On the one hand, the students are able to know the purpose of every subject before learning. On the other hand, the students can conduct a self-assessment to evaluate whether the specific learning outcomes of the subject have been achieved after the teaching. Some of the specific learning outcomes as specified in Sections 2.4.2 and 2.4.4 can be used directly or further expanded into more details to meet the particular nature of a subject.

The approaches used to achieve the specific learning outcomes, for example, lecture, tutorial, seminar, laboratory work, practical work, project work and case study should be described clearly in the syllabus of a subject. Function and justification of every approach adopted should also be explained.

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

The criteria-referenced assessment approach should be applied. Students' performance in a subject will be assessed by "how much" and "how good" that the specific criteria as specified in its syllabus can be achieved. Assessment should not be made on a relative basis**.**

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

Students' performance in a subject can be assessed by continuous assessment and/or examinations, at the discretion of the individual subject offering Department. Where both continuous assessment and examinations are used, the weighting of each in the overall subject grade shall be clearly stated in the definitive programme document. The subject offering

Department can decide whether students are required to pass both the continuous assessment and examination components, or either component only, in order to obtain a subject pass, but this requirement (to pass both, or either, components) shall be specified in the Definite Programme Document. Learning outcome should be assessed by continuous assessment and/or examination appropriately, in line with the outcome-based approach. Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous Assessment assignments which involve group work 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.

2.7 General Assessment Regulations (GAR)

The General Assessment Regulations adopted in the IPD Scheme will be in line with the prevailing GAR of the University. Some regulations are extracted and presented in the following sections.

2.7.1 Progression/Academic Probation/Deregistration

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

1. Eligible for progression towards an award; or

2. Eligible for an award; or

3. Required to be deregistered from the programme.

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

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

1. The student has exceeded the maximum period of registration for that programme, as specified in the definitive programme document; or

2. The student's GPA is lower than 2.0 for two consecutive semesters, and his Semester GPA in the second semester is also lower than 2.0; or

3. The student's GPA is lower than 2.0 for three consecutive semesters.

A student may be deregistered from the programme enrolled before the time frame specified in the above conditions 2 or 3 if his academic performance is poor to the extent that the BoE deems that his chance of attaining a GPA of 2.0 at the end of the programme is slim or impossible.

Where there are good reasons, the BoE has the discretion to recommend allowing student who fall into categories as stated in the above conditions 2 or 3 to stay on the programme, and these recommendations should be presented to the Faculty Board for final decision.

Under the current procedures, a student can appeal against the decision of BoE to deregister him. If such an appeal was upheld by the Scheme BoE, the recommendation (to reverse the previous decision to deregister the student) should also be presented to the Faculty Board for final decision.

2.7.2 Retaking of Subjects

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

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

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

2.7.3 Add/Drop of Subjects

Students are normally expected to follow the specified progression pattern. Any deviation will require approval from ME (for PAED award) or ISE (for PEM award).

A student can select elective subjects for his study on a semester basis through a subject registration system on web. Subject selection must be completed prior to the commencement of each semester. A student may apply for withdrawal of the registration on a subject after the add/drop period if he has a genuine need to do so. The application should be made to ME (for PAED award) or ISE (for PEM award) and will require the approval of both the subject lecturer and the host Department Award Leader concerned (or an alternate academic staff authorised by the programme host Department).

A student may choose not to study any subject in a semester. Application for zero subject enrolment in a semester should be made before the start of the semester and must not be later than the end of the add/drop period. Approval must be sought from ME (for PAED award) or ISE (for PEM award) to retain the study place. The semester with zero subject enrolment will also be counted towards the maximum period of registration for the scheme.

2.7.4 Credit Transfer and Exemption

A student may apply for credit transfer or exemption for a subject (including mandatory General University Requirement (GUR) subjects) if it has been studied in his recognized previous studies. All transferred credits will be counted towards meeting the requirements for

award, whereas the credits associated with an exempted subject will not be counted towards meeting the award requirements.

Applications for credit transfer/exemption should be made upon the initial enrolment on the scheme or before the end of the add/drop period of the semester concerned if the relevant credits are attained after admission. Application forms can be obtained from the Academic Secretariat (AS) and submitted to ME (for PAED award) or ISE (for PEM award).

2.7.5 Grading

Assessment grades shall be awarded on a criterion-referenced basis. A student's overall performance in a subject (including GUR subjects) shall be graded as shown in the following Table 2-11.

Table 2-11 Assessment Grades of a Subject

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

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

A numeral grade point is assigned to each subject grade, as shown in the following Table 2-12.

Table 2-12 Conversion between Grade and Grade Point

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

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

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

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

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

1. Exempted subjects
2. Ungraded subjects
3. Incomplete subjects
4. Subjects for which credit transfer has been approved, but without any grade assigned*
5. Subjects from which a student has been allowed to withdraw (i.e. those with the code 'W')

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

**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.*

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

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

Along with the 'cumulative' GPA, a Weighted GPA will also be calculated, to give an indication to the BoE on the award classification which a student will likely to get if he makes steady progress on his academic studies. GUR subjects will be included in the calculation of weighted GPA for all programmes. Weighted GPA will be computed as follows:

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

where Wi = weighting to be assigned according to the level of the subject

n = number of all subjects counted in GPA calculation as set out in Page A-18, 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.

When a student has satisfied the requirements for award, an Award GPA will be calculated to determine his award classification. GUR subjects will be included in the calculation of award GPA for all programmes. For calculating the weighted GPA (and award GPA) to determine the Honours classification of students who satisfy the graduation requirements of Bachelor's degree awards, a University-wide standard weighting will be applied to all subjects of the same level, with a weighting of 2 for Level 1 and 2 subjects, a weighting of 3 for Level 3 and 4 subjects. Same as for GPA, Weighted GPA is capped at 4.0. The following is the subject level code adopted by the University:

Level Code		Explanation
0	=	Pre-university level standard (and remedial subjects taken by new admittees to a 4-year degree programme, or some subjects offered to Higher Diploma students only)
1	=	Standard comparable to year 1 of a 4-year degree programme
2	=	Standard comparable to year 2 of a 4-year degree programme
3	=	Standard comparable to year 3 of a 4-year degree programme
4	=	Standard comparable to the final year of a 4-year degree programme
5	=	Master's degree level
6	=	Doctoral degree level

Example: The code "ENG1003" refers to a level-1 subject offered by Faculty of Engineering with the subject coding "003".

For students taking the Major/Minor option, a separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for BoE to moderate the award classification for the Major.

For students who have completed a Major programme combined with free electives, their award classification will be determined by their Major GPA and the grades obtained for the free electives.

The derivation of GPA for award classification for the First Major and Second Major (particularly on the counting of subjects common to both Majors) will be decided by the Department offering the Major programme. Whilst only award parchment will be issued for the Double Majors, it will list both Majors and the award classifications, which can be different for the 2 Majors.

As assessment should be a matter of judgement, not merely a result of computation, the subject lecturer will have the discretion to assign a grade which is considered to reflect more appropriately the overall performance of the student in a subject to override the grade derived by the computer.

The following Tables 2-13 and 2-14 are guidelines for BoE's reference in determining award classifications and a set of indicators which can be used in helping to determine award classification.

Table 2-13 Criteria for Award

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

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

Table 2-14 Suggested Weighted GPA for Award

Honours classification	*Weighted GPA*
1st	3.7^{+} - 4
2:i	3.2^{+} - 3.7^{-}
2:ii	2.3^{+} - 3.2^{-}
3rd	2.0 - 2.3^{-}

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

Under exceptional circumstances, a student who has completed an Honours degree programme, but has not attained Honours standard, may be awarded a Pass-without-Honours degree. A Pass-without-Honours degree award will be recommended when the student has demonstrated a level of final attainment which is below the 'essential minimum' required for graduation with Honours from the programme in question, but when he has nonetheless covered the prescribed work of the programme in an adequate fashion, while failing to show sufficient evidence of the intellectual calibre expected of Honours degree graduates.

2.7.6 Exceptional Circumstances

2.7.6.1 Absence from an Assessment Component

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

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

2.7.6.2 Aegrotat Award

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

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

The acceptance of an aegrotat award by a student shall disqualify him 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 BoE may determine whether the award should be classified, provided that they have adequate information on the students' academic performance.

2.7.6.3 Other Particular Circumstances

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

2.8 Work-Integrated Education (WIE)

Mandatory WIE should be in alignment with PolyU's strategic goal of providing value-added education leading to the development of all-round students with professional competence. This requires that the WIE activities should aim to achieve learning outcomes in the following:

- Professional knowledge and skills, and
- Attributes for all-roundedness.

Mandatory WIE activities should be structured as follow:

- There should be intended learning outcomes set for the workplace learning.
- Work experience should be purposefully designed to provide intentional learning aimed at the attainment of the intended outcomes, instead of leaving learning to occur incidentally as a side effect of work.
- Appropriate mechanisms of support provided by PolyU and workplace supervisors should be devised to ensure that effective learning does take place.

Mandatory WIE activities should be measured in terms of the following:

- Students should be required to document their workplace learning experience using instruments appropriate for demonstrating attainment of WIE learning outcomes, for example, reports, portfolios, etc.
- Assessment of the attainment of intended learning outcomes and the provision of student feedback should be built in.

Mandatory WIE activities are credit-bearing, but they are not included into the 124 academic credits required for graduation. The WIE components will **NOT** be counted towards GPA calculation. The minimum WIE duration is 2 weeks. Students will earn 1 credit for the completion of every 2 weeks of WIE activities.

In the IPD Scheme, mandatory WIE activities can be fulfilled by at least one of the following:

- Integrated into the final year PAED or PEM Capstone Project, which is industrial/commercial based. However, it is most important that the Capstone Project and WIE activities should be assessed separately. It is equally important that the WIE activities of students working in the same project team should be assessed individually as they can vary from student to student. In addition, duration of the WIE activities is not necessarily the same as that of the Capstone Project. In these cases the credit value of the project incorporating the WIE component will be counted in full towards the GPA calculation.

- Perform during a summer placement in industrial/commercial sector.

- Perform in a form proposed by the student and approved by ME/ISE.

In all cases, a plan for the WIE activities should be prepared by the student and his PolyU and workplace supervisors, and approved by ME/ISE before starting the activities. The plan should contain:

- The intended learning outcomes set for the workplace learning.

- The duration of WIE activities.

- Appropriate mechanisms of support provided by the PolyU and workplace supervisors to ensure that effective learning does take place.

- Method for the PolyU and workplace supervisors to monitor the student's progress and to provide timely feedback.

- Instrument for the student to demonstrate his attainment of WIE learning outcomes.

2.9 University Graduation Requirements for 4-year Full-time Undergraduate Degree

All candidates qualifying for a 4-year Full-time Undergraduate Degree offered from 2012/13 onward must meet:

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

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

2.10 Summary of University Graduation Requirements

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

1. Complete successfully a minimum of 120 credits*.
2. Earn a cumulative GPA (or both a Major GPA** and Minor GPA** if applicable) of 2.00 or above at graduation.
3. Complete successfully the mandatory Work-Integrated Education (WIE) component as specified by their programme/Major.
4. Satisfy the residential requirement for at least one-third of the normal credit requirement for the award to be completed under the current enrolment at PolyU.
5. Satisfy the following GUR requirements:

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

6. Satisfy any other requirements as specified in the Definitive Programme Document.

(a) Language and Communication Requirements (LCR)

English

All undergraduate students must successfully complete two 3-credit English language subjects as stipulated by the University (Table 1). These subjects are designed to suit students' different levels of English language proficiency at entry, as determined by their HKDSE score or the English Language Centre (ELC) entry assessment (when no HKDSE score is available). Students who are weaker in English at entry (with a HKDSE score of Level 3 with one or two sub-scores below Level 3) are required to take one or two extra credit-bearing English Language Enhancement subject(s) offered by ELC in their area(s) of weaknesses, as a pre-requisite for taking English LCR subjects****.

Students who can demonstrate that they have achieved a level beyond that of the LCR proficient level subjects as listed in Table 2 (based on an assessment by ELC) may apply for subject exemption or credit transfer of the LCR subject or subjects concerned.

Notes:

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

*** These requirements are applicable with effect from the 2012/13 cohorts of intakes, including students on Foundation Year programmes in 2011/12 who progress to stage 1 of FT undergraduate degree programmes in 2012/13. However, these are not applicable to students admitted to Senior Years in 2012/13 either on advanced standing or under the Senior Year quota.*

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

*****With effect from 2013/14 cohort of intakes, the requirement for these students to take Language Enhancement subjects, as a pre-requisite for taking English/Chinese LCR subjects, will be abolished.*

Table 1: Framework of English LCR subjects

HKDSE	Subject 1	Subject 2	Extra Subject(s) Required
Level 5 or equivalent	Advanced English for University Studies (AEUS) 3 credits	Any LCR proficient level subject in English (see Table 2) 3 credits	NIL
Level 4 or equivalent	English for University Studies (EUS) 3 credits	Advanced English for University Studies (AEUS) 3 credits	NIL
Level 3 or equivalent	Practical English for University Studies (PEUS) 3 credits	English for University Studies (EUS) 3 credits	NIL
Level 3 with one or two sub-scores below Level 3 or equivalent	Practical English for University Studies (PEUS) 3 credits	English for University Studies (EUS) 3 credits	**1 or 2** subjects from the ELC English Language Enhancement subjects (see Table 3) 2 credits each

Table 2: LCR Proficient level subjects in English

For students entering with HKDSE Level 5, or at an equivalent level or above	Advanced English Reading and Writing Skills	3 credits each
	Persuasive Communication	
	English in Literature and Film	

Table 3: ELC English Language Enhancement subjects

For students entering with HKDSE Level 3 with one or two sub-scores below Level 3	English Language Enhancement - Speaking Skills	2 credits each
	English Language Enhancement - Listening Skills	
	English Language Enhancement - Reading Skills	
	English Language Enhancement - Writing Skills	

Chinese

All undergraduate students are required to successfully complete one 3-credit Chinese language subject as stipulated by the University (Table 4). These Chinese subjects are designed to suit students' different levels of Chinese language proficiency at entry, as determined by their HKDSE score or the Chinese Language Centre (CLC) entry assessment (when no HKDSE score is available). Students who are weaker in Chinese at entry (with HKDSE sub-scores of Level 2) will be required to take one or two extra credit-bearing Chinese Enhancement subject(s) offered by CLC, in their area(s) of weakness, as a pre-requisite for taking the Chinese LCR subject*. Students can also opt to take additional Chinese LCR subjects (Table 7) in their free electives.

Students who are non-Chinese speakers (NCS), or whose Chinese standards are at junior secondary level or below, will also be required to take one LCR subject designed to suit their language background and entry standard as shown in Table 6.

Students who can demonstrate that they have achieved a level beyond that of the course "Advanced Communication Skill in Chinese" as listed in Table 4 (based on an assessment made by CLC) may apply for subject exemption or credit transfer of the LCR subject concerned.

Table 4: Framework of Chinese LCR subjects

	Required Subject	**Extra Subject(s) Required**
HKDSE Level 4 and 5 or equivalent	Advanced Communication Skills in Chinese (ACSC) 3 credits	NIL
HKDSE Level 3 or equivalent	Fundamentals of Chinese Communication (FCC) 3 credits	NIL
Level 3 with one or two sub-scores below Level 3	Fundamentals of Chinese Communication (FCC) 3 credits	**1 or 2** subjects from the CLC Chinese Language Enhancement subjects (see Table 5) 2 credits each
For non-Chinese speakers or students whose Chinese standards are at junior secondary level or below	One subject from Table 6 below	NIL

** With effect from 2013/14 cohort of intakes, the requirement for these students to take Language Enhancement subjects, as a pre-requisite for taking English/Chinese LCR subjects, will be abolished.*

Table 5: CLC Chinese Language Enhancement subjects

HKDSE	Subject 1	Subject 2
For students entering with HKDSE result at Level 3 with one sub-score below Level 3	Basic Writing Skills 2 credits	Nil
For students entering with HKDSE result at Level 3 with two sub-scores below Level 3	Basic Writing Skills 2 credits	Speech Genres and Verbal Communication 2 credits

Table 6: Chinese LCR Subjects for non-Chinese speakers or students whose Chinese standards are at junior secondary level or below

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

Table 7: Other LCR Electives in Chinese

Subject	Pre-requisite/exclusion	
Chinese and the Multimedia	• For students entering with HKDSE level 4 or above; or • students with advanced competence level as determined by the entry assessment; or • Students who have completed "Fundamentals of Chinese Communication"	3 credits each
Creative writing in Chinese	• For students entering with HKDSE level 4 or above; or • students with advanced competence level as determined by the entry assessment; or • Students who have completed "Fundamentals of Chinese Communication"	
Elementary Cantonese	For students whose native language is not Cantonese	
Putonghua in the Workplace	• Students have completed "Fundamentals of Chinese Communication" or could demonstrate the proof with basic Putonghua	

	proficiency • For students whose native language is not Putonghua	

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

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

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

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

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

(b) Freshman Seminar

All students must successfully complete, normally in their first year of study, one 3-credit Freshman Seminar offered by their chosen Broad Discipline. The purpose is to (1) introduce students to their chosen discipline and enthuse them about their major study, (2) cultivate students' creativity, problem-solving ability and global outlook, (3) give students an exposure to the concepts of, and an understanding of, entrepreneurship, and (4) engage students, in their first year of study, in desirable forms of university learning that emphasises self-regulation, autonomous learning and deep understanding.

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

(c) Leadership and Intra-Personal Development

All students must successfully complete one 3-credit subject in the area of Leadership and Intra-Personal Development, which is designed to enable students to (1) understand and integrate theories, research and concepts on the qualities (particularly intra-personal and interpersonal qualities) of effective leaders in the Chinese context, (2) develop greater self-awareness and a better understanding of oneself, (3) acquire interpersonal skills essential for functioning as an effective leader, (4) develop self-reflection skills in their learning, and (5) recognise the importance of the active pursuit of knowledge on an intra-personal and interpersonal level and its relationship to leadership qualities.

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

(d) Service-Learning

All students must successfully complete one 3-credit subject designated to meet the service-learning requirement, in which they are required to (1) participate in substantial community service or civic engagement activities that will benefit the service users or the community at large in a meaningful way, (2) apply the knowledge and skills acquired from their Major or other learning experiences at the University to the community service activities, and (3) reflect on their service learning experience in order to link theory with practice for the development of a stronger sense of ethical, social and national responsibility.

These subjects may take the form of:

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

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

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

(e) Cluster Areas Requirement (CAR)

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

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

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

(f) China Studies Requirement

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

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

(g) Healthy Lifestyle

Healthy lifestyle is the platform for all-round development. All students are required to successfully complete a non-credit-bearing programme in healthy lifestyle offered by the Student Affairs Office. The programme will cover: (1) fitness evaluation, (2) concepts on

health and fitness, (3) sports skills acquisition, and (4) exercise practicum. More details can be found at: http://www.polyu.edu.hk/sao/hlr

Students on Articulation Degree Programmes and Senior Year Intakes to the 4-year Ug degree programmes are not required to take the Health Lifestyle Programme. Full-time Advanced Standing students who are not holders of AD/HD are still required to take the Healthy Lifestyle Programme.

2.11 Normal Progression Pattern

In the University credit-based system, all academic programmes fit within a common framework, in which subjects of standard size (3 credits) are used as far as possible. The overall credit requirements consist of General University Requirements (GUR) and Discipline-Specific Requirements (DSR).

A total of 124 academic credits is required for graduation, which should be obtained from the following groups of subjects ((i), (ii), (iii) or (iv) and (v)). In addition, students should complete the scheduled IC practical training modules ((vi)) and the Work-Integrated Education (WIE) activities mandated by PolyU (Part 2 – Section 2.8), but these credits are not included into the above 124 academic credits.

Students are admitted into one of the two awards operating under the BEng (Hons) Scheme in Integrated Product Development. After the first four semesters, they can apply for transfer of study to another award, subject to conditions such as quota constraints, academic and interview performance.

These two awards are:

- BEng (Hons) in Product Analysis and Engineering Design (PAED)
- BEng (Hons) in Product Engineering with Marketing (PEM)

The scheme curriculum which can be completed within the normal duration of 8 semesters (equivalent to 4 years) is presented in Table 2-15.

Table 2-15 IPD Scheme Curriculum

(i) General University Requirements (Total: 30 credits):

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

(ii) Common Core Subjects (Total: 46 credits):

These subjects are necessary for every student to form a broad knowledge-base. Their syllabuses are presented in Part 4.

Subject (Level)	Offering Department	Suggested Semester
• AMA1110 Basic Mathematics I – Calculus and Probability & Statistics (Level 1)	AMA	1
• AP10005 Physics I (Level 1)	AP	1
• AMA1120 Basic Mathematics II – Calculus and Linear Algebra (Level 1)	AMA	2
• AP10006 Physics II (Level 1)	AP	2
• ENG2003 Information Technology (Level 2)	FENG	2
• AMA2111 Mathematics I (Level 2)	AMA	3
• SD348 Introduction to Industrial Design (Level 3)	SD	3
• AF3625 Engineering Economics (Level 3)	AF	3
• MM2711 Introduction to Marketing (Level 2)	MM	4
• ME22002 Integrated Product Development Fundamentals (Level 2)	ME	4
• ENG3004 Society and the Engineer (Level 3)	FENG	4
• ENG2001 Fundamentals of Materials Science and Engineering/Chemistry/Biology (Level 2)	FENG	4
• ELC3521 Professional Communication in English (Level 3)	ELC	5/6
• CBS3241P Professional Communication in Chinese* (Level 3)	CBS	5/6
• ISE386 Integrated Design for Manufacture (Level 3)	ISE	5/6
• ENG3003 Engineering Management (Level 3)	FENG	6/7

**This is the subject for meeting the discipline-specific Chinese language requirement. Students who are non-chinese speakers or those whose Chinese standards are at junior secondary level or below will be exempted from the discipline-specific Chinese language requirement. Students of this category can take a replacement subject of any level to make up for credit requirement.*

(iii) Subjects for PAED Award (Total: 42 credits):

These subjects are necessary for students taking the PAED award (syllabuses are presented in Part 4). In addition to the 12 Award core subjects, every student is also required to study 2 elective subjects (of which at least 1 should normally be ME subjects) from the pool of PAED award elective subjects. The application to study a maximum of one PEM award elective subject is normally allowed. A minimum class size of 15 students is suggested for every elective subject.

Subject (Level) – Each subject is of 3 credits	Offering Department	Suggested Semester
Award Core:		
• BME31125 Biomechanics (Level 2)	BME	5
• EE2901S Basic Electricity and Electronics (Level 2)	EE	5
• ME23001 Engineering Mechanics (Level 2)	ME	5
• SD3401 Designing for Humanities (Level 3)	SD	6
• ME34003 Thermofluid Mechanics (Level 3)	ME	6
• ME33001 Mechanics of Materials (Level 3)	ME	6
• ME31003 System Dynamics (Level 3)	ME	6
• ME42005 CAD/CAE Technologies for Product Development (Level 4)	ME	6
• ME41004 Mechatronics and Control (Level 4)	ME	7
• ME46001 Numerical Predictive Product Analysis (Level 4)	ME	7
• ME42006 Product Modeling and Prototyping (Level 4)	ME	8
• ME42007 Design for Product Safety and Reliability (Level 4)	ME	8
Award Elective (All are Level 4 subjects):		
• ENG4001 Project Management	FENG	7/8
• ME42002 Design for Packaging and No-assembly	ME	7/8
• ME42004 Development of Green Products	ME	7/8
• ME42001 Artificial Intelligence in Products	ME	7/8
• ME42003 Design for Six Sigma	ME	7/8
• ME43002 Nano- and Micro-Technology Applications to Product Development	ME	7/8
• ME43003 Product Testing Technology	ME	7/8
• SD4041 Design in Business for Engineering	SD	7/8
• SD4414 Design of Home and Personal Electronic Products	SD	7/8

(iv) Subjects for PEM Award (Total: 39 credits):

These subjects are necessary for students taking the PEM award (syllabuses are presented in Part 4). In addition to the 11 Award core subjects, every student is also required to study any 2 elective subjects (of which at least 1 should be from the pool of PEM award elective subjects). The application to study a maximum of one elective subject from the PAED award is normally allowed. A minimum class size of 15 students is suggested for every elective subject.

Subject (Level) – Each subject is of 3 credits	Offering Department	Suggested Semester
Award Core:		
• ISE309/EIE2302 Mechatronics for Products/ Electricity and Electronics (Level 3/2)	ISE/EIE	5
• ISE204 Instrumentation and Product Testing (Level 2)	ISE	5
• MM3761 Marketing Research (Level 3)	MM	5
• ISE369 Quality Engineering (Level 3)	ISE	6
• ISE306 Tool Design (Level 3)	ISE	6
• ISE430 New Product Planning and Development (Level 4)	ISE	7
• ISE4005 Eco-design & Manufacture (Level 4)	ISE	7
• ISE418 Computer-Aided Product Design (Level 4)	ISE	7
• MM4732 Global Marketing (Level 4)	ISE	7
• MM4711 Business to Business Marketing (Level 4)	MM	7
• ISE330 Product Safety and Reliability (Level 3)	MM	8
	ISE	8
Award Elective (All are Level 4 Subjects):		
• ISE404 Total Quality Management	ISE	7/8
• ISE419 Advanced Mould and Die Design	ISE	7/8
• ISE4007 Design for Soft Products and New Services	ISE	8
• ISE4009 Advanced Manufacturing Technology	ISE	7/8
• ISE4013 Product Innovation and Intellectual Property	ISE	7/8
• MM4721 Marketing Management in China	MM	7/8
• MM4781 Sales Management	MM	7/8
• SD4041 Design in Business for Engineering	SD	7/8
• SD4463 Sustainable Product Design	SD	7/8

(v) Projects (Total: 6 credits for PAED award; 9 credits for PEM award):

Projects are available for PAED and PEM awards. Group or individual project can be used. A project group normally consists of 3 students to facilitate teamwork. Report, presentation and prototype may normally be required.

The Capstone Project for PAED and PEM awards gives the students an opportunity for integrating their acquired knowledge and skills. In the final year, students should conduct a capstone project relevant to the selected award (PAED or PEM), which is an open-ended real-life project that facilitates a full integration of the curriculum or an experience of the whole product development process. ***The PAED Capstone Project is a group project whereas the PEM Capstone Project will be conducted on an individual basis***.

Technical competency as well as people competency should normally be the major criteria to be assessed. The criteria and method of assessment are clearly described in Part 4. IC would provide assistance to facilitate the fabrication of prototypes in these projects. In addition, the WIE credits may also be fulfilled by conducting the capstone project.

For PEM award, the project "Integrated Product Engineering Project" aims to develop PEM students' ability in applying and integrating the engineering theories and practices acquired from the related subjects.

Subject (Level)	Number of Credit	Offering Department	Suggested Semester(s)
• ISE3007 Integrated Product Engineering Project I(Level 3)	3	ISE	5
• ISE445 Capstone Project (Level 4)	6	ISE	7 & 8
• ME49003 Capstone Project (Level 4)	6	ME	7 & 8

(vi) Practical Training Modules (They are not included into the 124 academic credits but compulsory to complete before graduation):

The following compulsory practical training modules are provided within the first six semesters (syllabuses are presented in Part 4). It is aimed to provide the students with a total of 10 weeks (with a nominal of 36 hours per week) practical training. IC training credits will be graded and included in the GPA calculation. However, they will be excluded from the calculation of award classification. But students must pass all IC training modules in order to be eligible for award.

Subject (Level)	Offering Department	Suggested Semester(s)
• IC2105 Engineering Communication and Fundamentals (Level 2)	IC	1 & 2
• IC348 Appreciation of Manufacturing Processes (Level 3)	IC	3 & 4
• IC349 Integrated Manufacturing Project (Level 3)	IC	5 & 6
OR		
• IC3102 Integrated Product Engineering Project II (Level 3)	IC	6

The specified progression pattern of the full-time mode within the normal duration of 8 semesters (equivalent to 4 years) is recommended in the following Table 2-16, but this is not compulsory.

Students are required to fulfill the General University Requirements (GURs) as detailed in Table 2-15 (i) subject to a maximum study load per semester. **The study pattern for the GUR subjects in Table 2-16 is indicative only (with the exception of Freshman Seminar). Students may take these subjects according to their own schedule.**

Table 2-16 Specified Progression Pattern of the Full-time Mode

(Common Year for BEng (Hons) in PAED and PEM)

(Total credits required for graduation: 124 + 10 IC training credits)

1st Year (33 Credits+4 IC training credits)	
Semester I (18 Credits)	**Semester II (15 Credits)**
LCR I (3)	LCR II (3)
CAR I (3)	CAR II (3)
Freshman Seminar for Engineering (ENG1003) (3)	Information Technology (ENG2003) (3)
Basic Mathematics I – Calculus and Probability & Statistics (AMA1110) (3)	Basic Mathematics II – Calculus and Linear Algebra (AMA1120) (3)
Physics I (AP10005) (3)	Physics II (AP10006) (3)
Leadership and Intra-personal Development (3)	--
Healthy Lifestyle (0)	
Engineering Communication and Fundamentals (IC2105) (4 IC training credits)	

2nd Year (30 Credits+ 3 IC training credits)	
Semester I (15 Credits)	**Semester II (15 Credits)**
CAR III (3)	CAR IV (3)
LCR III (3)	Introduction to Marketing (MM2711) (3)
Engineering Economics (AF3625) (3)	Integrated Product Development Fundamentals (ME22002) (3)
Introduction to Industrial Design (SD348) (3)	Fundamentals of Materials Science and Engineering (ENG2001) / Chemistry*/ Biology* (3)
Mathematics I (AMA2111) (3)	Society and the Engineer (ENG3004) (3)
Appreciation of Manufacturing Processes (IC348) (3 IC training credits)	

**The following CAR subjects are adopted as options for the areas of 'Biology' and 'Chemistry' :*
Chemistry – Chemistry and Modern Living (ABCT1301), Chemistry and Sustainable Development (ABCT1302)
Biology – Biotechnology and Human Health (ABCT1303), Introductory Life Science(ABCT1101), Bionic Human and the Future of Being Human (BME11101)

Curriculum for BEng (Hons) in PAED Award (3rd and 4th Years)

(Total credits required for graduation: 124 + 10 IC training credits)

3rd Year (34 Credits+ 3 IC training credits)	
Semester I (16 Credits)	**Semester II (18 Credits)**
Biomechanics (BME31125) (3)	Designing for Humanities (SD3401) (3)
Service Learning (3)	Thermofluid Mechanics (ME34003) (3)
Basic Electricity and Electronics (EE2901S) (3)	System Dynamics (ME31003) (3)
Engineering Mechanics (ME23001) (3)	Mechanics of Materials (ME33001) (3)
Professional Communication in Chinese (CBS3241P) (2)	CAD/CAE Technologies for Product Development (ME42005) (3)
Professional Communication in English (ELC3521) (2)	Integrated Design for Manufacture (ISE386)(3)
Integrated Manufacturing Project (IC349) (3 IC training credits)	

4th Year (27 Credits)	
Semester I (15 Credits)	**Semester II (12 Credits)**
Engineering Management (ENG3003) (3)	Product Modeling and Prototyping (ME42006) (3)
Mechatronics and Control (ME41004) (3)	Design for Product Safety and Reliability (ME42007) (3)
Numerical Predictive Product Analysis (ME46001) (3)	Elective Subject II (3)
Elective Subject I (3)	--
Capstone Project (ME49003) (6)	

Curriculum for BEng (Hons) in PEM Award (3rd and 4th Years)

(Total credits required for graduation: 124 + 10 IC training credits)

3rd Year (31 Credits+3 training credits)	
Semester I (15 Credits)	**Semester II (16 Credits)**
Instrumentation and Product Testing (ISE204) (3)	Engineering Management (ENG3003) (3)
Mechatronics for Products (ISE309) / Electricity and Electronics (EIE2302) (3)	Professional Communication in English (ELC3521) (2)
Integrated Design for Manufacture (ISE386) (3)	Professional Communication in Chinese (CBS3241P) (2)
Marketing Research (MM3761) (3)	Quality Engineering (ISE369) (3)
Integrated Product Engineering Project I (ISE3007) (3)	Tool Design (ISE306) (3)
–	Service Learning (3)
–	Integrated Product Engineering Project II (IC3102) (3 IC training credits)

4th Year (30 Credits)	
Semester I (15 Credits)	**Semester II (15 Credits)**
New Product Planning and Development (ISE430) (3)	Business to Business Marketing (MM4711) (3)
Global Marketing (MM4732) (3)	Elective I* (3)
Eco-design & Manufacture (ISE4005) (3)	Elective II* (3)
Computer-Aided Product Design (ISE418) (3)	Product Safety & Reliability (ISE330) (3)
Capstone Project (ISE445) (6)	

*Electives	Select any **TWO** from the following subjects
	• Total Quality Management (ISE404) • Advanced Mould and Die Design (ISE419) • Design for Soft Products and New Services (ISE4007) • Advanced Manufacturing Technology (ISE4009) • Product Innovation and Intellectual Property (ISE4013) • Marketing Management in China (MM4721) • Sales Management (MM4781) • Design in Business for Engineering (SD4041) • Sustainable Product Design (SD4463)

Additional Subject Requirement for Physics

Students who do not have Level 2 or above in HKDSE Physics subjects (or Combined Science with a component in Physics) are required to take the following additional subject:-

Introduction to Physics (AP10001) (3 credits)

Double Fulfilment of DSR and CAR

Some DSR subjects are also designated as CAR subjects under the four cluster areas. They are the same subjects designated with different subject codes. Upon passing them, you will fulfill the requirements of both DSR and CAR. However, credits will not be counted twice. For example, if you have taken MM2711, you have fulfilled the CAR B requirement and earned only 3 credits instead of 6 credits. So you may need to take other subjects to make up the total credit requirement of the award. The list of subjects that fulfill both DSR and CAR of PAED and PEM awards operating under the IPD Scheme are shown below:

DSR Subjects	CAR Subjects	Cluster Area	Subject Title
MM2711	MM2B05	CAR – B	Introduction to Marketing
ABCT1101	ABCT1D04	CAR – D	Introductory Life Science
ABCT1301	ABCT1D01	CAR – D	Chemistry and Modern Living
ABCT1302	ABCT1D02	CAR – D	Chemistry and Sustainable Development
ABCT1303	ABCT1D03	CAR – D	Biotechnology and Human Health
BME11101	BME1D01	CAR – D	Bionic Human and the Future of Being Human

2.12 Curricula for Senior Year Intakes

The normal study pattern of the senior year curricula and the credits for graduation requirement for PAED and PEM award are presented in Table 2-17 and Table 2-18 respectively.

Table 2-17 Normal study pattern of the senior year curriculum for PAED award

(Total credits required for graduation: 64 + 6 IC training credits)

1st Year (34 Credits+ 3 IC training credits)	
Semester I (16 Credits)	**Semester II (18 Credits)**
Introduction to Industrial Design (SD348) (3)	Designing for Humanities (SD3401) (3)
Society and the Engineer (ENG3004) (3)	Thermofluid Mechanics (ME34003) (3)
Service Learning^# (3)	System Dynamics (ME31003) (3)
CAR I# (3)	Mechanics of Materials (ME33001) (3)
Professional Communication in Chinese (CBS3241P) (2)	CAD/CAE Technologies for Product Development (ME42005) (3)
Professional Communication in English (ELC3521) (2)	Integrated Design for Manufacture (ISE386)(3)
IC348 Appreciation of Manufacturing Processes (3 training credits)	
Summer Term	
IC349 Integrated Manufacturing Project (3 training credits)	

2nd Year (30 Credits)	
Semester I (15 Credits)	**Semester II (15 Credits)**
Engineering Management (ENG3003) (3)	Product Modeling and Prototyping (ME42006) (3)
Mechatronics and Control (ME41004) (3)	Design for Product Safety and Reliability (ME42007) (3)
Numerical Predictive Product Analysis (ME46001) (3)	Elective Subject II (3)
Elective Subject I (3)	CAR II # (3)
ME49003 Capstone Project (6)	

Remarks: Those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programme and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement.

^Prior to its full implementation, students can choose to take a 3-credit free elective subject in lieu of service learning subject in 2014/15 in order to fulfil the graduation requirements.

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

Discipline Specific Requirements (DSR) Subjects		Credits
I) Compulsory		49
CBS3241P	Professional Communication in Chinese	(2)
ELC3521	Professional Communication in English	(2)
ENG3003	Engineering Management	(3)
ENG3004	Society and the Engineer	(3)
ISE 386	Integrated Design for Manufacture	(3)
ME31003	System Dynamics	(3)
ME33001	Mechanics of Materials	(3)
ME34003	Thermofluid Mechanics	(3)
ME41004	Mechatronics and control	(3)
ME42005	CAD/CAE technologies for product development	(3)
ME42006	Product Modeling and prototyping	(3)
ME42007	Design for product Safety and Reliability	(3)
ME46001	Numerical Predictive Product Analysis	(3)
ME49003	Capstone Project	(6)
SD3401	Designing for Humanities	(3)
SD348	Introduction to Industrial Design	(3)
II) Elective Students are required to complete two 3-credit elective subjects from the elective pool.		6
III) Training		6
IC348	Appreciation of Manufacturing Process	(3)
IC349	Integrated Manufacturing Project	(3)
	Total DSR credits	55 + 6 training credits

Table 2-18 Normal study pattern of the senior year curriculum for PEM award

(Total credits required for graduation: 64 + 6 IC training credits)

Year 1 (34 Credits + 6 IC training credits)	
Semester I (18 Credits + 1.5 IC)	**Semester II (16 Credits + 4.5 IC)**
CAR I# (3)	CAR II# (3)
Quality Engineering (ISE369) (3)	Professional Communication in English (ELC3521) (2)
Integrated Design for Manufacture (ISE386) (3)	Professional Communication in Chinese (CBS3241P) (2)
Marketing Research (MM3761) (3)	Engineering Management (ENG3003) (3)
Society and the Engineer (ENG3004) (3)	Tool Design (ISE306) (3)
-	Service Learning^# (3)
Integrated Product Engineering Project I (ISE3007) (3)	Integrated Product Engineering Project II (IC3102) (3 IC training credits)
Appreciation of Manufacturing Processes (IC348) (3 IC training credits)	

Year 2 (30 Credits)	
Semester I (15 Credits)	**Semester II (15 Credits)**
New Product Planning and Development (ISE430) (3)	Business to Business Marketing (MM4711) (3)
Global Marketing (MM4732) (3)	Elective I* (3)
Eco-design & Manufacture (ISE4005) (3)	Elective II* (3)
Computer-Aided Product Design (ISE418) (3)	Product Safety & Reliability (ISE330) (3)
Capstone Project (ISE445) (6)	

Remarks: Those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programme and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement.

^Prior to its full implementation, students can choose to take a 3-credit free elective subject in lieu of service learning subject in 2014/15 in order to fulfil the graduation requirements.

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

*Electives	Select any **TWO** from the following subjects
	• Total Quality Management (ISE404) • Advanced Mould and Die Design (ISE419) • Design for Soft Products and New Services (ISE4007) • Advanced Manufacturing Technology (ISE4009) • Product Innovation and Intellectual Property (ISE4013) • Sales Management (MM4781) • Marketing Management in China (MM4721) • Design in Business for Engineering (SD4041) • Sustainable Product Design (SD4463)

2.13 Curriculum Map

A curriculum map is provided in Tables 2-19 (for PAED award) and Table 2-20 (for PEM award). The specific learning outcomes achieved by every subject of the award are listed clearly, such that all the specific learning outcomes as specified in Section 2.4 can be shown to be fully fulfilled by the curriculum built upon a combination of most suitable subjects as shown in Section 2.11.

Table 2-19 ILOs Achieved by PAED Award
(T – TEACH; P – PRACTICE; M – MEASURED)

I) General University Requirements (GUR) Subjects

		PROGRAMME OUTCOMES											
		PAK							**POW**				
		a	**b**	**c**	**d**	**e**	**f**	**g**	**a**	**b**	**c**	**d**	**e**
COURSE/MODULE/SUBJECT NUMBERS	LCR English I											TP	
	LCR English II											TP	
	LCR Chinese											TP	
	Leadership							T					
	Service-learning				TP		TP			T	T		
	Freshman Seminar										T		T
	CAR I - IV								T				T

II) Discipline-specific Requirements (DSR) Subjects

		PROGRAMME OUTCOMES											
		PAK							POW				
		a	b	c	d	e	f	g	a	b	c	d	e
COURSE/MODULE/SUBJECT NUMBERS	**Faculty Common**												
	AF3625	T	T				T		T	T		T	T
	AMA1110	T	T	T									
	AMA1120	T	T	T									
	AMA2111	T	T	T									
	AP10005			T									
	AP10006			T									
	CBS3241P											TPM	
	ELC3521											TPM	
	ENG2001	T	T	P					T				
	ENG2003	T	T	P		T			T			TPM	
	ENG3003					T		TPM	T	T	T	T	
	ENG3004							TP	TM	T	TM	T	T
	Award Core												
	ME22002	TP	TP				TP	TP		TP	TP	TP	TP
	MM2711	T		T		TP	T						
	ISE386	T	TP	TP	P	P	TP		T	T		P	P
	SD348	T	TP	TP	TP	P	TP	TP	TP	TP		TP	
	SD3401					P	TP		TP				
	EE2901S			T		TP							T
	BME31125		TP	TP	T								
	ME23001		TP	TPM		P				TP		T	
	ME31003		TP	TPM								T	
	ME33001			TPM	TP								
	ME34003	TP	TP	TPM		TP			TP			TP	
	ME41004		TP	TP		PM						P	
	ME42005		TP	TP	TP	TPM	TP	TP					
	ME42006		TPM	TP	TP	TP	TPM	TP					
	ME42007	TP		TP	TPM	TP	TP	TP	TPM	M		P	
	ME46001			TP	TP	TP						P	
	ME49003	TPM	TPM	TP	TPM	TP	TPM	TP	TP	TPM	TP	TPM	TPM

III) Elective Subjects

		PROGRAMME OUTCOMES											
		PAK							POW				
		a	b	c	d	e	f	g	a	b	c	d	e
	ENG4001							TP M		TP		TP	T
	ME42001		TP	TP		TP						P	
	ME42002	TP	TP	TP	TP	TP	TP			TP		P	
	ME42003	TP			TP	TP						P	
	ME42004	TP		TP	P		TP					P	
	ME43002			TP	P	TP						P	TP
	ME43003		TP	TP		TP				TP			TP
	SD4041	TP	TP				T		TP			TP	
	SD4414	TP	TP	T	T				T			TP	T

IV) Training Subjects

		PROGRAMME OUTCOMES											
		PAK							POW				
		a	b	c	d	e	f	g	a	b	c	d	e
COURSE/MODULE/ SUBJECT NUMBERS	IC2105	TP	TP	TP		TP	TP	TP					
	IC348				P	P	P	PM					
	IC349				PM	P	P	P		PM		P	
	WIE								P	P	p	p	p

- *Definition of the Intended Learning Outcomes of the PAED Award are shown in Section 2.4.2.*

Table 2-20 Curriculum Map that We Teach (T), Give Students Practice (P) and Measure (M) the Intended Learning Outcomes of the PEM Award

SUBJECT CODES	SUBJECT TITLES	ILOs OF THE PEM AWARD (Section 2.4.4)						
		1	2	3	4	5	6	7
CBS1101P[@]	Fundamentals of Chinese Communication				TP			
CBS1102P[@]	Advanced Communication Skills in Chinese				TP			
CBS3241P	Professional Communication in Chinese				TP			P
ELC1011[#]	Practical English for University Studies				TP			
ELC1012/3[#]	English for University Studies				TP			
ELC1014[#]	Advanced English for University				TP			
ELC2011[#]	Advanced English Reading and Writing Skills				TP			
ELC2012[#]	Persuasive Communication				TP			
ELC2013[#]	English in Literature and Film				TP			
ELC3521	Professional Communication in English				TPM			P
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics		TP					
AMA1120	Basic Mathematics II – Calculus and Linear Algebra		TP					
AMA2111	Mathematics I		TP					
AP10005	Physics I		TP					
AP10006	Physics II		TP					
APSS1L01	Tomorrow's Leaders					TP		

EIE2302^	Electricity & Electronics		TP					
ENG1003	Freshman Seminar for Engineering	TP	TP		P	P		
ENG2001+	Fundamentals of Materials Science and Engineering		TP					
ENG2003	Information Technology		TP			P		
AF3625	Engineering Economics			TP			TP	
ENG3003	Engineering Management	TP	TP			P		
ENG3004	Society and the Engineer	T	TP		TP	P	TPM	
IC2105	Engineering Communication and Fundamentals	TP	TP		TP		T	T
IC348	Appreciation of Manufacturing Processes	TP	TP					
IC3102	Integrated Product Engineering Project II	P	PM	P	P	PM	P	P
ISE3007	Integrated Product Engineering Project I	T	TP	T	T	P	T	
ISE204	Instrumentation and Product Testing		TP		TP		TP	TP
ME22002	Integrated Product Development Fundamentals		TP	TP			T	
ISE306	Tool Design	TP	TP	TP	P	P		
ISE309^	Mechatronics for Products		TP					
ISE330	Product Safety and Reliability	T	T	P	P		T	P
ISE369	Quality Engineering	T	TP					
ISE386	Integrated Design for Manufacture	T	TP		P	P		
ISE404	Total Quality Management	TP		T			T	

ISE418	Computer-Aided Product Design	T	TP		P	P	T	P
ISE419	Advanced Mould and Die Design	TP	TP		P	P		
ISE430	New Product Planning and Development	TPM		TPM	P	P		
ISE445	Capstone Project	PM	PM	PM	TPM	PM		PM
ISE4005	Eco-design and Manufacture	T	TP	TP	P	P	TP	P
ISE4007	Design for Soft Products and New Services	T	TP	TP	P	P	T	P
ISE4009	Advanced Manufacturing Technology		TP		TP	P		P
ISE4013	Product Innovation and Intellectual Property		TP		P	P		T
MM2711	Introduction to Marketing	T		TP	P	P	T	
MM3761	Marketing Research		TP	TP	P	P		
MM4711	Business to Business Marketing			TP	P	P	T	
MM4721	Marketing Management in China			TP	P	P		
MM4732	Global Marketing			TP	P	P	TP	
MM4781	Sales Management			TP	P	P		
SD348	Introduction to Industrial Design		TP	TP	TP	TP	TP	T
SD4041	Design in Business for Engineering	TP		TP		P		
SD4463	Sustainable Product Design	TP		TP		P	TP	
Work Integrated Education (WIE)						PM		PM

GUR subjects of service-learning, cluster area requirement (CAR), and healthy lifestyle not directly linked with the outcomes are not included.

@ Either one of these two subjects

Either two of these subjects

^ Either one of these two subjects

+ It may be replaced by a level one chemistry or biology subject.

2.14 Study Options

The total credit requirement for graduation for PAED/PEM award is 124. Students are allowed to take more elective subjects beyond GUR and DSR until the total number of credits reaches 150 without incurring a higher tuition rate. Students can use these extra electives for fulfilling the requirements of a particular combination of study options, for taking advanced electives, or for further broadening purposes. For senior year intake students, they would not be given an option to study for a minor.

Students taking the Major/Minor option will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 2.0 or above for the Major programme, Minor programme and overall) and have also submitted an application for graduation. If the 18 credits taken for the approved Minor study can meet the requirements for that Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. Otherwise, students will graduate with a Major only. Subject to approval by the Minor-offering Department, students may count up to 6 credits from their Major/GUR [including Language Communication Requirements (LCR) subjects at proficiency level] towards their chosen Minor.

Students taking the Double Majors option are required to obtain an overall GPA of at least 2.0 for each of the 2 Majors, in order to satisfy the requirement for graduation with Double Majors. They will not be allowed to graduate with one of the 2 Majors. The total credit requirement of Double Majors will depend on the degree of commonality between the two Majors. Apart from the 30 credits of GUR subjects, up to 1/3 of the DSR of the first Major which are common to the second Major can be double-counted towards the second Major.

Part 3: Programme Management, Resource and Support

3.1 Programme Operation and Management

The IPD Scheme is hosted by the Faculty of Engineering (FENG). It consists of two awards: PAED and PEM.

The day-to-day administration for the students and the awards would primarily fall under the respective responsibility of ME and ISE. ME is responsible for the operation and management of PAED Award, while ISE is responsible for the PEM Award. The Faculty Office would look after and provide support in Year 1 and Year 2 which requires the administration on a Scheme basis. The relevant committees, working groups, and their membership and people responsible are listed as below.

3.1.1 Scheme Committee

The Scheme Committee is responsible for the overall academic operation, quality assurance and management of the scheme. It is also responsible for the development and routine updating of the academic content of the scheme. The composition of the Scheme Committee is shown in Table 3-1.

Table 3-1 Composition of the Scheme Committee

Chairman
❑ Dean of The Faculty of Engineering
Deputy Chairman
❑ Leader of PAED Award [ME] ❑ Leader of PEM Award [ISE]
Ex-officio Members
❑ Head of Department [ME] ❑ Head of Department [ISE]
Members
❑ Subject Representatives (4 nominations each from ISE and ME) ❑ Representatives from major contributing departments (one nomination from each department) ❑ Student Representatives
Secretary and Deputy Secretary
❑ Administrative Officer/Executive Officer [FENG] ❑ Administration Officer/Executive Officer [ME] ❑ Administrative Officer/Executive Officer [ISE]

Student Representatives are elected annually for appointment to the Scheme Committee. The Committee is directly responsible to relevant committees of ME and ISE for all matters related to development and quality assurance of teaching and learning.

3.1.2 Scheme Executive Group

The day-to-day operation of the scheme will be carried out by the Scheme Executive Group, which consists of the Scheme Chairman and Deputy Scheme Chairmen. The Group reports back to the Scheme Committee.

3.1.3 Student-Staff Consultative Group

The Student-Staff Consultative Group consists of Student Representatives and the Scheme Executive Group. The Group is normally chaired by the Scheme Chairman. It meets on a need basis and should normally meet at least once every semester to discuss student workload, teaching and learning methods, balance between subjects areas, training matters and other areas of mutual concern, and to report and make recommendations to the Scheme Committee when necessary.

The following composition of the Student-Staff Consultative Group applies to those enrolled on Year One and Year Two of the Scheme. As from Year Three Semester 1 onwards, Student-Staff Consultative Group would be conducted on an award basis individually by ISE and ME for their students.

Table 3-2 Composition of the Student-Staff Consultative Group

Chairman
❑ Scheme Chairman
Members
❑ Deputy Scheme Chairmen ❑ Student Representatives: (2 Class Representatives each from Year One/Year Two)
By invitation
❑ Subject Lecturers concerned
Secretary
❑ Staff from FENG Faculty Office

3.1.4 Assessment Results and Board of Examiners

Subject Lecturers have sole responsibilities for marking students' coursework and examinations scripts, grading them, finalising the results and informing each student of his results, in respect of the subject they teach. In this regard, Subject Lecturers will be accountable to the Head of the subject offering Department, to ensure that the scripts are correctly marked and graded, and to avoid administrative errors at all times. To ensure consistency and uniformity for a common subject taught by different Subject Lecturers, meetings can be arranged amongst them before the examination papers are set or before the marking is done.

Subject Assessment Review Panel (SARP) may also be formed by the Head of the Department offering the subjects to review and finalise the subject grades for submission to the BoE. Each Department may form one SARP to take care of all subjects it offers.

The authority for approving the overall results of students rests with the BoE. One week after all the subject results have been finalised, the BoE shall confirm the overall results of students on the programme/scheme, including award classifications for final year students and de-registration cases.

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

The BoE will meet at the end of each semester. The meeting will be convened by the Office of the Faculty of Engineering for Year One and Year Two and by ME (for PAED award) and ISE (for PEM award) as from Year Three onwards. The BoEs for the PAED and the PEM awards will include the Award Leader of the sister award as Observer. The BoE is responsible for making decision on:

1. the classification of awards to be granted to each student on completion of the scheme;

2. de-registration cases; and

3. cases with extenuating circumstance.

Since this is an inter-disciplinary scheme hosted by FENG, the composition of its BoE is as shown in Table 3-3.

Table 3-3 Membership of the Board of Examiners (BoE)

Chairman
❑ Dean of The Faculty of Engineering
Deputy Chairman
❑ Leader of PAED Award [ME] ❑ Leader of PEM Award [ISE]
Members
❑ Head of Department [ME] or Delegate ❑ Head of Department [ISE] or Delegate ❑ Subject Representatives ❑ Representatives from major contributing departments
Secretary and Deputy Secretary
❑ Administrative Officer/Executive Officer [FENG] ❑ Administration Officer/Executive Officer [ME] ❑ Administrative Officer/Executive Officer [ISE]

3.1.5 Academic Advising

Academic advising at PolyU aims to help students to make informed and intelligent academic decisions/choices about their study at PolyU that suit their intellectual, professional and personal goals. It is instrumental to promoting student success, and plays a vital role in enhancing students' overall learning experience at PolyU. The specific objectives are:

- To build up an early connection between the students and their home departments, and to promote their sense of affiliation to the department and the University,
- To provide students with accurate information about the academic regulations and requirements regarding their Major/programme, as well as the GUR,
- To assist students to explore their interests, abilities and values on academic pursuits, and formulate appropriate intellectual, professional and personal goals,
- To provide advice and guidance to students that enables them to develop and pursue a study plan for their 4 years of study appropriate for meeting their intellectual, professional and personal goals,
- To connect students to resources, opportunities and support within and outside the University that enhance their educational experiences and success.

Every student will be assigned an Academic Advisor from ME or ISE Department. The Academic Advisors, as front-line advisors to students, are responsible for providing students with relevant and current information about curriculum and programme requirements, advising students of the suitable combination of subjects before subject registration in each semester, giving academic advice to students related to their studies, assisting students in solving problems encountered in their studies, and referring students to other offices and units for relevant information or support.

ME and ISE Department should assign a non-academic staff to take up the role of an "Undergraduate Secretary". The Undergraduate Secretary have the necessary knowledge to advise students on all issues related to academic requirements and regulations related to all academic programmes offered by the department as well as the GUR requirements. The person should be readily available to students to answer any questions related to the curriculum.

At the institutional level, the office of General University Requirement is set up with experienced academic advisors and administrative staff to provide academic advising for students, particularly on requirements and subject choices in relation to the GUR. Other responsibilities of the office include:

- Working with the CoGUR to provide the overall coordination and management of GUR offerings, ensuring that students can fulfill their GUR requirements in a timely manner,
- Providing updated information on GUR requirements to staff and students, and offering training and support for departmental academic advisors and Undergraduate Secretaries,
- Overall coordination and quality assurance of academic advising at PolyU.

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 Major/programme, 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.

3.2 Staff Development, Research, Consultancy and Related Activities

ME and ISE are actively engaged in research and consultancy work in the area of product design and development. Their outcomes are used to underpin the development of curriculum and to facilitate the teaching and learning of the scheme. Appropriate staff development activities to facilitate the teaching and learning, in particular related to the student-learning-outcomes approach, are also conducted actively by both Departments.

Details of these activities are presented in the following documents:

- Annual Report of Department of Mechanical Engineering
- Laboratory Facilities of Department of Mechanical Engineering
- Annual Report of Department of Industrial and Systems Engineering
- Laboratory Facilities of Department of Industrial and Systems Engineering

3.3 Resource Support for the Scheme

As the IPD scheme is fully funded by the UGC, thus, both ME and ISE have sufficient resources (staffing and non-staffing resources) to facilitate the smooth operation and healthy development of the scheme.

Part 4: Subject Descriptions

The Subject Description Forms for all the subjects (all GUR subjects except for Freshman Seminar are excluded) as specified in Section 2 – Table 2-15 are provided. Each of them contains the items related to the subject, e.g. title and code, number of credits obtained after satisfactory completion, offering department(s), subject category (compulsory or elective), level, hours assigned for different teaching and learning activities, pre-requisites, co-requisites and/or exclusions, objectives, learning outcomes achieved after satisfactory completion of the subject, teaching and learning approaches aligned with the Outcome-Based-Approach, assessment methods aligned with the Outcome-Based-Approach, syllabus, textbooks/reference books/reading list. The detailed Subject Description Forms are given in the following section.

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	**Exclusion**: AF2618
Objectives	This subject aims to equip students with 1. the fundamental concepts of micro- and macroeconomics related to the engineering industry; 2. the fundamental understanding of finance and costing for engineering operations, budgetary planning and control.
Intended Learning Outcomes	Upon successful completion of this subject, students will be able to: a. understand how the relevant economic factors shape the environment within which an engineering company operates; b. evaluate the financial condition of a company based on the financial statements; c. apply the basic cost accounting techniques in the planning and control of engineering and production activities.
Subject Synopsis/ Indicative Syllabus	**Economic Environment of a Firm** **Microeconomic Factors** Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition, monopoly and oligopoly **Macroeconomic Factors** Government interventions: fiscal policy and monetary policy; International trade and globalization **Accounting and Engineering Economics** Financial statements; Financial ratio analysis; Return on investment; Composition of cost; Cost-volume-profit analysis; Accounting profit versus economic profit **Fundamentals of Budgetary Planning and Control** Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives

<table>
<tr><td>Teaching/Learning Methodology</td><td>The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students' understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td></tr>
<tr><td>Continuous Assessment</td><td>50%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1. In-class activities</td><td>15%</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>2. Written assignments</td><td>15%</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>3. Test</td><td>20%</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Final Examination</td><td>50%</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>

To pass this subject, students are required to obtain Grade D or above in <u>both</u> the Continuous Assessment and Examination components.
</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><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>• Study and self-learning</td><td>48 Hrs.</td></tr>
<tr><td>▪ Written assignments</td><td>18 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
</table>
</td></tr>
</table>

Reading List and References	**Recommended Textbooks** Parkin and Bade, 2014, *Foundations of Microeconomics*, 6th Edition, Pearson. Sullivan, Wicks and Koelling, 2014, *Engineering Economy,* 16th Edition, Pearson. **References** Drury, Colin, 2008, *Management and Cost Accounting,* 7th Edition, Cengage Learning. Frank, Robert H., 2007, *The Economic Naturalist: Why Economics Explain Almost Everything?* Basic Books.

Subject Description Form

Subject Code	AMA1110
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
Intended Learning Outcomes *(Note 1)*	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.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	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 in optimization. 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.
Teaching/Learning Methodology *(Note 3)*	Basic concepts and elementary techniques of limit, differential calculus, probability and statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.

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	d		
1.Homework, quizzes and mid-term test	50%	✓	✓	✓	✓		
2. Examination	50%	✓	✓	✓	✓		
Total	100 %						

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

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

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

The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	26 Hrs
	▪ Tutorial	13 Hrs
	Other student study effort:	
	▪ Homework and Self-study	81 Hrs
	Total student study effort	120 Hrs

Reading List and References

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

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

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 / Co-requisite/ Exclusion</td><td>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
(Note 1)</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
(Note 2)</td><td>Elementary calculus: Mean Value Theorem with applications to linear approximation 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 engineering.
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
(Note 3)</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
(Note 4)</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1.Homework, quizzes and mid-term test</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</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 mathematical techniques in solving problems in science and engineering. To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: *The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.*	
Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	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	

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics I – Calculus and Probability & Statistics (AMA1110) or Basic Mathematics II –Calculus and Linear Algebra (AMA1120)
Co-requisite/ Exclusion	Nil
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> Review of matrices, determinants and 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.

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

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

The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected

Class contact:	
• Lecture	26 Hrs
• Tutorial	13 Hrs
• Mid-term test and examination	
Other student study effort	5 Hrs

	• Assignments and Self study	73 Hrs
	Total student study effort:	117 Hrs
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2013. 2. Anton, H. *Elementary Linear Algebra* (11th edition). John Wiley, 2013. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2008). *Modern Engineering Mathematics*, 4th ed. Prentice Hall. 5. Thomas, G. B., Weir, M. D. & Hass, J. R. (2009). *Thomas' Calculus*, 12th ed. Addison Wesley.	

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 and Newton's law; 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. define electrostatic field and potential; f. solve problems on interaction between current and magnetic field; and g. apply Faraday's law to various phenomena.
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 hrs
• Tutorial	6 hrs

	Other student study effort:	
	• Self-study	81 hrs
	Total student study effort	120 hrs
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	AP10005
Subject Title	Physics I
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.
Intended 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. define simple harmonic motion and solve simple problems; d. explain the formation of acoustical standing waves and beats; e. use Doppler's effect to explain changes in frequency received. f. explain ideal gas laws in terms of kinetic theory; g. apply the first law of thermodynamics to simple processes; and h. solve simple problems related to the Carnot cycle.
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; gravitation field; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave; Doppler effect; acoustics. **Thermal physics**: conduction, convection and radiation; black body radiation and energy quantization; 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 Hrs.
• Tutorial	6 Hrs.
Other student study effort:	

	• Self-study	81 Hrs.
	Total student study effort:	120 Hrs.
Reading List and References	John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2010, 8th edition, Brooks/Cole Cengage Learning. W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.	

Subject Description Form

Subject Code	AP10006
Subject Title	Physics II
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with fundamental knowledge in physics focusing on the topics of waves and electromagnetism. This course prepares students to study science, engineering or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply simple laws in optics to explain image formation; b. explain phenomena related to the wave character of light; c. define electrostatic field and potential; d. use Gauss' law in solving problems in electrostatics; e. solve problems on interaction between current and magnetic field; f. apply electromagnetic induction to various phenomena; and g. solve simple problems in AC circuits.
Subject Synopsis/ Indicative Syllabus	**Waves and optics**: nature of light, reflection and refraction; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen's principle; interference and diffraction; interferometers and diffraction grating; 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 and RC circuits; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; self-inductance and mutual inductance; 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	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 Hrs.
• Tutorial	6 Hrs.
Other student study effort:	
• Self-study	81 Hrs.
Total student study effort	120 Hrs.

Reading List and References	John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2010, 8th edition, Brooks/Cole Cengage Learning. W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>APSS1L01</td></tr>
<tr><td>Subject Title</td><td>Tomorrow's Leaders</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>1</td></tr>
<tr><td>GUR Requirements Intended to Fulfill</td><td>This subject intends to fulfill the following requirement(s) :

□ Healthy Lifestyle
□ Freshman Seminar
□ Languages and Communication Requirement (LCR)
☒ Leadership and Intra-Personal Development
□ Service-Learning
□ Cluster-Area Requirement (CAR)
□ Human Nature, Relations and Development
□ Community, Organization and Globalization
□ History, Cultures and World Views
□ Science, Technology and Environment
□ China-Study Requirement
□ Yes or □ No
□ Writing and Reading Requirements
□ English or □ Chinese</td></tr>
<tr><td>Pre-requisite / Co-requisite/ Exclusion</td><td>Nil</td></tr>
<tr><td>Assessment Methods</td><td>
<table>
<tr><td>100% Continuous Assessment</td><td>Individual Assessment</td><td>Group Assessment</td></tr>
<tr><td>1. Class Participation</td><td>20%</td><td></td></tr>
<tr><td>2. Peer Assessment</td><td>5%</td><td></td></tr>
<tr><td>3. Group Project</td><td></td><td>30%</td></tr>
<tr><td>4. Individual Assignment</td><td>45%</td><td></td></tr>
</table>
</td></tr>
</table>

Objectives	Specific objectives of the subject: The course is designed to enable students to learn and integrate theories, research and concepts of the basic personal qualities (particularly intrapersonal and interpersonal qualities) of effective leaders. This course also intends to help students develop and reflect on their intrapersonal qualities, interpersonal qualities and connection of learning to oneself. Finally, the course cultivates students' appreciation of the importance of intrapersonal and interpersonal qualities in effective leadership.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: a. Understand and integrate theories, research and concepts on the basic qualities (particularly intrapersonal and interpersonal qualities) of effective leaders; b. Develop self-awareness and self-understanding; c. Acquire interpersonal skills; d. Develop self-reflection skills; e. Understand the importance of intrapersonal and interpersonal qualities in effective leadership, particularly the connection of learning in the subject to one's personal development.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. An overview of the personal attributes of effective leaders: roles of self-understanding and interpersonal relationship qualities in effective leadership. 2. Self-understanding: theories and concepts; personal qualities that are conducive to successful leadership. 3. Cognitive competence: different types of thinking styles; higher-order thinking; experiential learning; role of cognitive competence, critical thinking and problem solving in effective leadership. 4. Emotional competence: awareness and understanding of emotions; emotional quotient (EQ); role of emotional management in effective leadership; mental health and stress management. 5. Resilience: stresses faced by adolescents; life adversities; coping with life stresses; role of resilience in effective leadership. 6. Morality and integrity: moral issues and moral competence; role of morality in effective leadership; ethical leadership; integrity and effective leadership. 7. Spirituality: meaning of life and adolescent development; spirituality and mental health; role of spirituality in effective leadership; servant leadership. 8. Positive and healthy identity: self-identity, self-esteem and self-concept; self-discrepancies; role of self-concept in effective leadership. 9. Relationship building, team building and conflict management: relationship quality and effective leadership; conflict management and effective leadership. 10. Social competence and egocentrism: basic social competence skills; roles of social competence, care and compassion in effective leadership; egocentrism in university students. 11. Interpersonal communication: theories, concepts, skills and blocks of interpersonal communication; role of communication skills in effective leadership.

<table>
<tr><td></td><td>12. Self-leadership and sense of responsibility in effective leaders; life-long learning and leadership.</td></tr>
<tr><td>Teaching/Learning Methodology
(Note 3)</td><td>Students taking this course are expected to be sensitive to their own behavior in intrapersonal and interpersonal contexts. Intellectual thinking, reflective learning, experiential learning and collaborative learning are emphasized in the course. Case studies on successful and fallen leaders will also be covered in the course. The teaching/learning methodology includes:

1. Lectures;
2. Experiential classroom activities;
3. Group project presentation;
4. Written assignment.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes
(Note 4)</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>1. Class Participation</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Peer Assessment</td><td>5%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>3. Group Project</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>4. Individual Assignment</td><td>45%</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>

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

1. <u>Assessment of Class Participation</u>: It is expected that classroom activities and preparation for lectures can help students understand the subject matter and oneself, develop social skills, connect learning to oneself and promote an appreciation of the importance of intrapersonal and interpersonal leadership qualities. Hence, marks for class participation and preparation for lectures will be given. Students will be assessed by: a) preparation for class (e.g., complete online assignment and dig up materials before class), b) participation in class (e.g., completion of worksheets and sharing) and c) volunteering to answer questions and join discussions in class.

2. <u>Peer Assessment</u>: Students will be invited to rate the performance and learning of other group members in an honest and authentic manner. The marks will reflect the mastery of knowledge, self-reflection and quality of interpersonal skills (such as collaboration with other members and contribution to the group) of the group members. Peer assessment will contribute to marks in class participation.</td></tr>
</table>

	3. Assessment of Group Project: Group project presentation can give an indication of the students' understanding and integration of theories and concepts on personal qualities in effective leadership, personal and group reflections, interpersonal skills and degree of recognition of the importance of active pursuit of knowledge covered in the course. 4. Assessment of Individual Assignment: Individual paper can give an indication of the students' understanding and integration of theories and concepts on the personal qualities in effective leadership, self-assessment, self-reflection, connection of the subject matter to oneself and degree of recognition of the importance of active pursuit of knowledge covered in the course. Based on the implementation of this subject in the past two academic years (2010-2011; 2011-2012), evaluation findings consistently showed that this subject was able to achieve the intended learning outcomes in the students. The positive evaluation findings are documented as follows: Shek, D. T. L. (2012a). Development of a positive youth development subject in a university context in Hong Kong. *International Journal on Disability and Human Development, 11*(3), 173-179. Shek, D. T. L. (2012b). Post-lecture evaluation of a positive youth development subject for university students in Hong Kong. *The Scientific World Journal, 2012*, 8 pages. doi: 10.1100/2012/934679 Shek, D. T. L. (2012c). Reflective journals of students taking a positive youth development course in a university context in Hong Kong. *The Scientific World Journal*, *2012*, 8 pages. doi: 10.1100/2012/131560 Shek, D. T. L. (2013a). Reflections of Chinese students on a university subject on leadership and intrapersonal development. *International Journal on Disability and Human Development, 12*(2), 213-219. Shek, D. T. L. (2013b). Promotion of holistic development in university students: A credit-bearing subject on leadership and intrapersonal development. *Best Practices in Mental Health, 9*(1), 47-61. Shek, D. T. L., & Sun, R. C. F. (2012a). Focus group evaluation of a positive youth development course in a university in Hong Kong. *International Journal on Disability and Human Development*, *11*(3), 249-254. Shek, D. T. L., & Sun, R. C. F. (2012b). Process evaluation of a positive youth development course in a university setting in Hong Kong. *International Journal on Disability and Human Development*, *11*(3), 235-241. Shek, D. T. L., & Sun, R. C. F. (2012c). Promoting leadership and intrapersonal competence in university students: What can we learn from Hong Kong? *International Journal on Disability and Human Development*, *11*(3), 221-228.

<table>
<tr><td></td><td colspan="2">Shek, D. T. L., & Sun, R. C. F. (2012d). Promoting psychosocial competencies in university students: Evaluation based on a one group pretest-posttest design. International Journal on Disability and Human Development, 11(3), 229-234.

Shek, D. T. L., & Sun, R. C. F. (2012e). Qualitative evaluation of a positive youth development course in a university setting in Hong Kong. International Journal on Disability and Human Development, 11(3), 243-248.

Shek, D. T. L., & Sun, R. C. F. (2013a). Post-course subjective outcome evaluation of a course promoting leadership and intrapersonal development in university students in Hong Kong. International Journal on Disability and Human Development, 12(2), 193-201.

Shek, D. T. L., & Sun, R. C. F. (2013b). Post-lecture evaluation of a university course on leadership and intrapersonal development. International Journal on Disability and Human Development, 12(2), 185-191.

Shek, D. T. L., & Sun, R. C. F. (2013c). Process evaluation of a leadership and intrapersonal development subject for university students. International Journal on Disability and Human Development, 12(2), 203-211.

Shek, D. T. L., Sun, R. C. F., & Merrick, J. (2012). Editorial: How to promote holistic development in university students? International Journal on Disability and Human Development, 11(3), 171-172.

Shek, D. T. L., Sun, R. C. F., & Merrick, J. (Eds.). (2013). University and college students: Health and development issues for the leaders of tomorrow. New York: Nova Science Publishers.

Shek, D. T. L., Sun, R. C. F., Chui, Y. H., Lit, S. W., Yuen, W. W., Chung, Y., & Ngai, S. W. (2012). Development and evaluation of a positive youth development course for university students in Hong Kong. The Scientific World Journal, 2012, 8 pages. doi: 10.1100/2012/263731

Shek, D. T. L., Sun, R. C. F., Tsien-Wong, T. B. K., Cheng, C. T., & Yim, H. Y. (2013). Objective outcome evaluation of a leadership and intrapersonal development subject for university students. International Journal on Disability and Human Development, 12(2), 221-227.

Shek, D. T. L., Sun, R. C. F., Yuen, W. W. H., Chui, Y. H., Dorcas, A., Ma, C. M. S., Yu, L., Chak, Y. L. Y., Law, M. Y. M., Chung, Y..Y. H., & Tsui, P. F. (2013). Second piloting of a leadership and intrapersonal development subject at The Hong Kong Polytechnic University. International Journal on Disability and Human Development, 12(2), 107-114.</td></tr>
<tr><td rowspan="3">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures and experiential learning activities</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
</table>

	▪ Group project preparation	20 Hrs.
	▪ Reading and writing term paper	73 Hrs.
	Total student study effort	132 Hrs.
Medium of Instruction	English	
Medium of Assessment	English	
Reading List and References	**Basic References:** Barki, H., & Hartwick, J. (2004). Conceptualizing the construct of interpersonal conflict. *The International Journal of Conflict Management*, *15*(3), 216-244. Catalano, R. F., Berglund, M. L., Ryan, J. A. M., Lonczak, H. S., & Hawkins, J. D. (2002). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Prevention and Treatment, 5*(15), 1-106. Dalton, J., & Crosby, P. (2007). Being and having: Shouldn't excellence in higher education (and people) be a measure of what one does rather than what one has? *Journal of College and Character, 9*(1), 1-5. Dolbier, C. L., Soderstrom, M. & Steinhardt, M. A. (2001). The relationships between self-leaders and enhanced psychological, health and work outcomes. *Journal of Psychology*, *135*(5), 469-485. Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: W. W. Norton & Company, Inc. Gilley, A., Gilley, J. W., McConnell, C. W., & Veliquette. A. (2010). The competencies used by effective managers to build teams: An empirical study. *Advances in Developing Human Resources, 12*(1), 29-45. Goleman, D. (1995). *Emotional Intelligence: Why it can matter more than IQ*. New York: Bantam Books. Houghton, J. D., & Yoho, S. K. (2005). Toward a contingency model of leadership and psychological empowerment: When should self-leadership be encouraged? *Journal of Leadership and Organizational Studies, 11*(4), 65-84. Kim, Y. H., Chiu, C. Y., & Zou, Z. M. (2010). Know thyself: Misperceptions of actual performance undermine achievement motivation, future performance, and subjective well-being. *Journal of Personality and Social Psychology*, *99*(3), 395-409. Kohlberg, L. (1964). Development of moral character and moral ideology. In M. L. Hoffman, & L. W. Hoffman (Eds.), *Review of child development*	

research (pp. 381-431). New York: Russell Sage Foundation.

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Ma, H. K. (2012). Social competence as a positive youth development construct: A conceptual review. *The Scientific World Journal,* 2012, 7 pages. doi:10.1100/2012/287472.

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Masten, A. S., & Obradović, J. (2006). Competence and resilience in development. *Annals of the New York Academy of Sciences, 1094*(1)*,* 13-27.

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Rycek, R. F., Stuhr, S. L., McDermott, J., Benker, J., & Swartz, M. D. (1998). Adolescent egocentrism and cognitive functioning during late adolescence. *Adolescence, 33*(132), 745-749.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, *9*(3), 185-211.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5-14.

Shek, D. T. L. (2010). Nurturing holistic development of university students in Hong Kong: Where are we and where should we go? *The Scientific World Journal, 10*, 563-575.

Shek, D. T. L. (2012). Spirituality as a positive youth development construct: A conceptual review. *The Scientific World Journal*, *2012*, 8 pages. doi:10.1100/2012/458953

Sun, R. C. F., & Hui, E. K. P. (2012). Cognitive competence as a positive youth development construct: A conceptual review. *The Scientific World Journal, 2012*, 7 pages. doi:10.1100/2012/210953

Supplementary References:

Adler, R. B., Rosenfeld, L. B., & Proctor II, R. F. (2010). *Interply: The process of interpersonal communication.* New York: Oxford University Press.

Bandura, A. (1986). *Social foundations of thought and action.* New Jersey: Prentice-Hall.

	Bass, B. M., & Steidlmeier, P. (1999). Ethics, character, and authentic transformational leadership behavior. *Leadership Quarterly, 10*(2), 181-217. Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning theory perspective for construct development and testing. *Organizational Behavior and Human Decision Processes, 97*(2), 117-134. Cao, L., & Nietfeld, J. L. (2007). College students' metacognitive awareness of difficulties in learning the class content does not automatically lead to adjustment of study strategies. *Australian Journal of Educational and Developmental Psychology, 7,* 31-46. Carver, C. S., & Scheier, M. F. (2000). *Perspectives on personality (4th Ed.).* Boston: Allyn and Bacon. Cheung, C. K., & Lee, T. Y. (2010). Contributions of moral education lectures and moral discussion in Hong Kong secondary schools. *Social Psychology of Education: An International Journal*, *13*(4), 575-591. Davey, M., Eaker, D. G., & Walters, L. H. (2003). Resilience processes in adolescents: Personality profiles, self-worth, and coping. *Journal of Adolescent Research, 18*(4), 347-362. Govier, I. (2000). Spiritual care in nursing: A systematic approach. *Nursing Standard, 14*(17), 32-36. Kumru, A., & Thompson, R. A. (2003). Ego identity status and self-monitoring behavior in adolescents. *Journal of Adolescent Research, 18*(5), 481-495. Luthans, F., Vogelgesang, G. R., & Lester, P. B. (2006). Developing the psychological capital of resiliency. *Human Resource Development Review, 5*(1), 25-44. Neck, C. P., & Houghton, J. D. (2006). Two decades of self-leadership theory and research: Past developments, present trends, and future possibilities. *Journal of Managerial Psychology*, *21*(4), 270-295. Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, *6*(1), 111-135. Saarni, C. (1999). *The development of emotional competence.* New York: Guilford.

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	CBS3241P
Subject Title	Professional Communication in Chinese
Credit Value	2
Level	3
Pre-requisite / Co-requisite	Chinese LCR subjects (in Semester 2 of Year 3 or Semester 1 of Year 4)
Objectives	This subject aims to develop the language competence for professional communication in Chinese required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals and reports.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to a. plan, organise and produce professionally acceptable project proposals and reports with appropriate text structures and language for different intended readers b. plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis/ Indicative Syllabus	1. Project proposals and reports in Chinese • Planning and organising project proposals and reports • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the literature to substantiate project proposals • Describing the methods of study • Describing and discussing project results, including anticipated results and results of pilot study • Presenting the budget, schedule and/or method of evaluation • Writing executive summaries./abstracts 2. Oral presentations of projects • Selecting content for audience-focused presentations • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in team

<table>
<tr><td></td><td>presentations
• Using effective verbal and non-verbal interactive strategies</td></tr>
<tr><td>Teaching/Learning Methodology</td><td><u>Learning and teaching approach</u>
The subject is designed to develop the students' Chinese language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects.
The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations.
The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an engineering-related project to different intended readers/audiences. During the course, students will be involved in:
- planning and researching the project
- writing project-related documents such as project proposals and reports
- giving oral presentations to intended stakeholders of the project
<u>Collaboration of input/support from the Language Centres and the Engineering discipline</u>
Students of this subject will also take the subject "Professional Communication in English", and will work on the same project in both subjects. In producing professionally acceptable documents and delivering effective presentations, students will be engaged in the use of appropriate Chinese and English language and skills, as well as applying knowledge learned in their Engineering subjects. As such, the planning, design and implementation of the teaching and learning activities and assessments will involve collaboration between the teaching staff from the CLC, the ELC, and staff from the Engineering discipline.
The study plan outlining the allocation of contact hours is attached.</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td><td></td></tr>
<tr><td>1. Project proposal in Chinese</td><td>60%</td><td>✓</td><td></td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Oral presentation of project proposal</td><td>40%</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>
</td></tr>
</table>

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

1. The assessments will arise from the course-long engineering-related project.
   - Students will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences.
   - Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.
2. There will be collaboration between the teaching staff from the Language Centres and the discipline in assessing students' performances. It is expected that the teaching staff of the Engineering discipline will provide support in assessing students' application of discipline knowledge. They will be involved in assessing the oral presentations intended for experts rather than those for laymen.

3. Hence the assessment pattern will be as follows:

Assessment type	Intended readers/audience	Timing	Assessors
Oral presentation of project – Team presentation of 30 minutes, in groups of 4 – Simulating a presentation of the proposal in progress	Mainly engineering experts	Weeks 10-11	CLC staff and Engineering staff
Written proposal in Chinese – Document of around 1,500 words for the final proposal	Mainly laymen	Week 12-13	CLC

Student Study Effort Expected	Class contact:	**Student Study Effort Expected**
	a. Seminars	26 Hrs.
	Other student study effort:	
	b. Researching, planning, writing, and preparing the project	44 Hrs.
	Total student study effort	70 Hrs.

Reading List and References	a) 司有和 (1984) ：《科技寫作簡明教程》，安徽教育出版社。 b) 葉聖陶、呂叔湘、 朱德熙、 林燾 (1992)：《文章講評》 語文出版社。 c) 于成鯤主編（2003）：《現代應用文》，復旦大學出版社。 d) 岑紹基、謝錫金、祈永華 (2006) ：《應用文的語言・語境・語用》，香港教育圖書公司。 e) 邵敬敏主編 (2010) ：《現代漢語通論 (第二版)》，上海教育出版社。 f) 于成鯤、陳瑞端、秦扶一、金振邦主編 (2010)：《中國現代應用文寫作規範叢書：科教文與社交文書寫作規範》，復旦大學出版社。 g) 香港特別行政區政府教育局・課程發展處中國語文教育組 (2012) ：《常用字字形表》，政府物流服務署印。

52 contact hours; with seminars for Chinese and English every week continuously over the 13 weeks **(Assessments shaded)**

Writing and presenting projects in English *(Week, contact hours and content)*		*Writing and presenting projects in Chinese* *(Week, contact hours and content)*		*Involvement of Engineering Discipline*
1 (2 hrs)	**Introduction to course and project; pre-course task**	1 (2 hrs)	**Introduction to course and project; pre-course task**	• Setting the scenarios and requirements for the course-long project • Providing discipline-related supplementary information regarding the projects
2-5 (8 hrs)	**Writing project proposals and reports** • Planning and organising project proposals and reports • Explaining the background; objectives; scope; significance • Supporting with the literature • Describing the methodology and anticipated results	2-5 (8 hrs)	**Writing project proposals and reports** • Planning and organising project proposals and reports • Explaining the background; objectives; scope; significance • Supporting with the literature • Describing the methodology and anticipated results	
6 (2 hrs)	**Tutorials on the plan for the proposal**	6-7 (4 hrs)	**Tutorials on the first draft of the proposal**	
7-9 (6 hrs)	**Writing project proposals and reports** (continued) • Describing and analysing project results (e.g. results of pilot study) • Describing the budget; schedule and/or method of evaluation • Writing executive summaries/abstracts	8-9 (4 hrs)	**Writing project proposals and reports** (continued) • Describing and analysing project results (e.g. results of pilot study) • Describing the budget; schedule and/or method of evaluation • Writing executive summaries/abstracts	
10-12 (6 hrs)	**Submit English written proposal in Week 10 (30%) (Intended readers: experts)** **Delivering oral presentations of projects** • Analysing needs of different audiences • Selecting relevant and appropriate content • Choosing appropriate language and tone	10-11 (4 hrs)	**Delivering oral presentations of projects** • Analysing needs of different audiences • Selecting relevant and appropriate content • Choosing appropriate language and tone • Using effective interactive strategies	• Assessing the English written proposals intended for experts

	• Using effective interactive strategies			
13-14 (4 hrs)	**Team oral presentations (20%)** **(Intended audience: laymen)**	12-13 (4 hrs)	**Team oral presentations (20%)** **(Intended audience: expert)** **(Submit Chinese written proposal in Week 14 (30%)** **(Intended audience: laymen)**	• Assessing the Chinese team presentations intended for experts

Subject Description Form

Subject Code	ELC3521
Subject Title	Professional Communication in English
Credit Value	2
Level	3
Pre-requisite / Co-requisite	English LCR subjects
Objectives	This subject aims to develop the language competence for professional communication in English required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in English, students will be able to: a. plan, organise and produce professionally acceptable project proposals with appropriate text structures and language for different intended readers b. plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis/ Indicative Syllabus	1. Project proposals in English • Planning and organising project proposals • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the literature to substantiate project proposals • Describing the methods of study • Describing and discussing project results, including anticipated results and results of pilot study • Presenting the budget, schedule and/or method of evaluation • Writing executive summaries/abstracts 2. Oral presentations of projects in English • Selecting content for audience-focused presentations • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in team presentations • Using effective verbal and non-verbal interactive strategies

Teaching/Learning Methodology

Learning and teaching approach

The subject is designed to develop the students' English language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects.

The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations.

The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an engineering-related project to different intended readers/audiences. During the course, students will be involved in:

- planning and researching the project
- writing project-related documents such as project proposals
- giving oral presentations to intended stakeholders of the project

Collaboration of input/support from the English Language Centre and the Engineering discipline

Students of this subject will also take the subject *Professional Communication in Chinese*, and will work on the same project in both subjects. In producing professionally acceptable documents and delivering effective presentations, students will be engaged in the use of appropriate Chinese and English language and skills, as well as applying knowledge learned in their Engineering subjects. As such, the planning, design and implementation of the teaching and learning activities and assessments will involve collaboration between the teaching staff from the CLC, the ELC, and staff from the Engineering discipline.

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. Project proposal in English	60%	✓		✓			
2. Oral presentation of project proposal in English	40%		✓	✓			
Total	100 %						

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

1. The assessments will arise from the course-long engineering-related project.

<table>
<tr><td></td><td>

Students will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences.
Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.

2. There will be collaboration between the teaching staff from the English Language Centre and the discipline in assessing students' performances. It is expected that the teaching staff of the Engineering discipline will provide support in assessing students' application of discipline knowledge. They will be involved in assessing the oral presentations intended for experts rather than those for laymen.
3. Hence the assessment pattern will be as follows:
<table>
<tr><td>Assessment type</td><td>Intended readers/ audience</td><td>Timing</td><td>Assessors</td></tr>
<tr><td>(English)
Written proposal in English – Document of around 1,500 words for the initial proposal</td><td>Mainly engineering experts</td><td>Week 8</td><td>ELC and Engineering staff</td></tr>
<tr><td>(English)
Oral presentation of project in English
– Team presentation of 30 minutes, in groups of 4
– Simulating a presentation of the final proposal</td><td>Mainly non-experts</td><td>Weeks 12-13</td><td>ELC</td></tr>
</table>
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Seminars</td><td>26 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Researching, planning, writing, and preparing the project</td><td>52 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>78 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>
Beer, D. F. (Ed.). (2003). Writing and speaking in the technology professions: A practical guide (2nd ed.). Hoboken, NJ: Wiley.
Johnson-Sheehan, R. (2008). Writing proposals (2nd ed.). New York, NY:
</td></tr>
</table>

	Pearson/Longman. Kuiper, S. (2007). *Contemporary business report writing* (3rd ed.). Cincinnati, OH: Thomson/South-Western. Lawrence, M. S. (1975). *Writing as a thinking process: Teacher's manual.* Ann Arbor, Mich: University of Michigan Press. Reep, D. C. (2006). *Technical writing: Principles, strategies and readings* (6th ed.). New York, NY: Pearson/Longman.

Subject Description Form

Subject Code	ENG1003
Subject Title	Freshman Seminar for Engineering
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. Introduce students to the engineering broad discipline and enthuse them about their major study 2. Cultivate students' creativity and problem-solving ability, and global outlook 3. Introduce students to the concept of entrepreneurship 4. Engage the students in desirable forms of learning at university that emphasizes self-regulation, autonomous learning and deep understanding
Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study b. Develop their problem-solving ability and global outlook c. Be able to demonstrate an understanding of entrepreneurship d. Be able to search for information, formulate a project plan, and manage a project with initiative e. Be able to demonstrate an understanding of academic integrity.
Subject Synopsis/ Indicative Syllabus	*1. Online Tutorial on Academic Integrity (3 hours*)* Students will be required to complete successfully an Online *Tutorial on Academic Integrity* on or before week 5 of the first semester. The students will understand the importance of academic integrity by completing the Online Tutorial. *2. Renowned Speaker Seminars (6 hours*)* The Renowned Speaker Seminar will be given by a renowned speaker to introduce to students the engineering broad discipline and to enthuse them about their major study. The seminars will also cultivate students' global outlook. *3. Departmental Seminar (12 hours*)* The Departmental Seminar will be delivered by senior academic staff and/or reputable professionals in the engineering broad discipline to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession.

	4. Freshman Project (42 hours)* There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, and team-work abilities through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems. *5. Entrepreneurship Project (42 hours*)* The entrepreneurship project is designed to develop students' appreciation and understanding about entrepreneurship and the commercialization process by attending lectures, workshops and tutorials. In the course of the Entrepreneurship Project, students will identify technology opportunities and learn the skills of preparing a simple business plan. (* Note: hours indicate total student workload)
Teaching/Learning Methodology	*Online Tutorial on Academic Integrity* The *Online Tutorial on Academic Integrity* is developed by the University to help the students understand the importance of academic integrity. By going through the Online Tutorial, students will be aware of the importance of upholding academic integrity during University study. They will also learn good practices by which to stay clear of dishonest behaviors and academic plagiarism. *Seminars* The renowned speaker seminars and departmental seminars are designed to arouse students' interest about engineering. The delivery mode will be *interactive* and *engaging*. Students will be motivated to make preparation by searching for information and doing background reading. They will be encouraged to raise questions and discuss with the presenters. Assessment tasks (quizzes) will be designed to measure students' learning outcomes as well as to encourage participation and interaction. *Freshman Project* For the Freshman Project, students will work collaboratively with their group members to design and implement an engineering solution to a given problem under the guidance of instructors. There will be close staff-students and students-students *interaction*. Students will be given opportunities to develop creativity, problem-solving skills and team-work abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student's performance and achievement as well as to encourage active participation. *Entrepreneurship Project* There will be lectures, workshops, and tutorials. A general overview of the concepts required to conduct the project will be provided to students through lectures. They will then work in small groups in a workshop to appreciate the essential elements in the development of a business plan and

<table>
<tr><td></td><td>subsequently to produce a simple business plan and to present it to fellow classmates. Assessment will focus towards students' understanding about entrepreneurship, innovation and creativity.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>Students' performance in this subject will be assessed by using a letter-grading system in accordance with the University's convention from grade F (failure) to A+. The relative weights of the different assessment components are as follows:
<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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>Online Tutorial on Academic Integrity</td><td>0%</td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>Seminars
Quizzes</td><td>20%</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Freshman Project
Project demonstration, presentation, report and reflective essay writing</td><td>40%</td><td></td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>Entrepreneurship Project
Business plan</td><td>40%</td><td></td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="5"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Quizzes (online or paper-based) can measure the students' understanding about the engineering discipline. Through reflective essays, students can reflect on their appreciation and understanding about the engineering discipline. Through project demonstration, presentation and project reports, students can demonstrate their creativity, problem-solving skills and team-work abilities. They can also demonstrate their ability to search for information, formulate a project plan, and manage a project with initiative. Through business plan, students can demonstrate their understanding about entrepreneurship.

Pass Conditions

In order to pass this subject, students must obtain a Grade D or above for total marks comprising the Seminars, Freshman Project and Entrepreneurship Project as described here AND pass the Online Tutorial on Academic Integrity on or before week 5 of semester 1 as described in the previous section.</td></tr>
<tr><td>Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td></td><td>▪ Introduction and pre-seminar meeting</td><td>3 hours</td></tr>
</table>

	▪ Freshman project: 3 hours per week for 5 weeks	15 hours
	▪ Entrepreneurship project: 3 hours per week for 5 weeks	15 hours
	▪ Renowned Speaker Seminar and Departmental Seminars	3 hours
	Other student study effort:	
	▪ 69 hours (for Online Tutorial on Academic Integrity; background information search, project work, preparing and doing quizzes after seminars, meeting and discussion, preparation for presentation and demonstration, and report writing.)	69 Hours
	▪ Total student study effort	105 Hours
Reading List and References	H. Scott Fogler and Steven E. LeBlanc, *Strategies for creative problem solving*, Upper Saddle River, N.J. : Prentice Hall, 2008 N.J. Smith (ed), *Engineering project management*, Oxford, UK; Malden, MA: Blackwell, 2008 Gene Moriaty, *The engineering project: its nature, ethics, and promise,* University Park, Pa.: Pennsylvania State University Press, 2008. K. Allen, *Entrepreneurship for scientists and engineers*, Upper Saddle River, N.J. : Prentice Hall, 2010.	

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%		√	√			
3. 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	39 Hrs.
	Other student study effort:	
	▪ Guided reading, assignments and reports	37 Hrs.
	▪ Self-study and preparation for test and examination	47 Hrs.
	Total student study effort	123 Hrs.
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)	

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 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 computers and operating 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	1. Introduction to computers Introduction to information technology using Cloud Computing as a real life example. Introduction to modern computers (Personal Computers/Computer Clusters) and operating systems (Resource Management/Privilege Control). 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 Router). 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

<table>
<tr><td></td><td>Information systems. Workflow management. Case study: Database design, implementation and management.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</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 (Please tick as appropriate)</td></tr>
<tr><td>A1</td><td>A2</td><td>A3</td><td>A4</td><td>B1</td><td></td></tr>
<tr><td>1. Continuous Assessment</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>2. Examination</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The assessment methods include an end-of-subject examination (50%), quizzes in lectures (20%), five laboratory sessions/workshops (20%), and quizzes in tutorial sessions (10%). The examination and quizzes cover intended subject learning outcomes A1, A2, A3, A4 and B1. The laboratory sessions/workshops cover intended subject learning outcomes A2, A3, A4, and B5.
The examination is a 2-hour, closed-book examination, quizzes in lectures are open-book quizzes, and quizzes in tutorial sessions are closed-book quizzes. The laboratory sessions/workshops give students hands-on experience on setting up internet-applications, building up computer networks, and constructing database.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures (18), tutorials (6), and workshops (15)</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Workshops preparation (6/workshop)</td><td>30 Hrs.</td></tr>
<tr><td>▪ Self study (3/week)</td><td>39 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>108 Hrs.</td></tr>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures (18), tutorials (6), and workshops (15)</td><td>39 Hrs.</td></tr>
</table>
</td></tr>
</table>

Reading List and References	1. B. Williams and S. Sawyer, *Using Information Technology: A Practical Introduction to Computers and Communications*, 10th ed., McGraw-Hill, 2013. 2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 6th ed., Pearson, 2012. 3. D. E. Comer, *Computer Networks and Internets: with Internet Applications*, 5th ed., Prentice-Hall, 2008. 4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed., McGraw-Hill, 2009. 5. W. Stalling, *Data and Computer Communications*, 9th ed., Prentice-Hall, 2011. 6. P. Rob and C. Coronel, *Database Systems: Design, Implementation, and Management*, 9th Edition, Thomson, 2011. 7. M. Mannino, *Database Design, Application Development, & Administration*. 5th ed., McGraw-Hill, 2011.

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 exam 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. <u>Management of Change</u> Strategic leadership and innovation; Organizational change; Leading planned change; Organizational development; Stress management; Factors that affect the execution of change 5. <u>Effects of Environmental Factors</u> The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues
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 (20%) • Final presentation (individual presentation and group report) (20%)	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. Introduction to Management, Schermerhorn, 12th Edition, John Wiley, 2013 2. Fundamentals of Management - Global 8th ed by Robbins, De Cenzo and Mary, Pearson, 2013 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, 2010, The Management of Technology and Innovation: A Strategic Approach, 2nd Ed., , Cengage Learning	

Subject Description Form

Subject Code	ENG3004
Subject Title	Society and the Engineer
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject is designed for engineering students as a complementary subject on the role of the professional engineer in practice and their responsibilities toward the profession, colleagues, employers, clients, and the public. The objectives of the subject are to enable students to 1. appreciate the historical context of modern technology and the nature of the process whereby technology develops and its relationship between technology and the environment, as well as the implied social costs and benefits; 2. understand the social, political, legal, and economic responsibilities and accountability of the engineering profession and the organizational activities of professional engineering institutions; 3. be aware of the short-term and long-term effects related to safety and health of technology applications; 4. observe the professional conduct as well as the legal and other applicable constraints related to various engineering issues.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify and evaluate the effects of technology applications in the social, cultural, economic, legal, health, safety, environment, and dimensions of the society; b. explain the importance of local and international professional training, professional conduct, ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; c. evaluate in a team setting the implications of a specific project in the eight dimensions of project issues related to engineers, and present the findings to laymen and peers.
Subject Synopsis/ Indicative Syllabus	1. <u>Impact of Technology on Society</u> Innovation and creativity; History and trends of technology on social and cultural developments of society 2. <u>Environmental Protection and Related Issues</u> Roles of the engineer in energy conservation, ecological balance, and sustainable development

<table>
<tr><td></td><td>3. <u>Outlook of Hong Kong's Industry</u>

Support organizations and impacts on economic development in Greater China and the Pacific Rim

4. <u>Industrial Health and Safety</u>

The Labour Department and the Occupational Health and Safety Council; Legal dimensions such as contract law and industrial legislation

5. <u>Professional Institutions</u>

Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers

6. <u>Professional Ethics</u>

Prevention of bribery and corruption; The work of the Independent Commission Against Corruption (ICAC); Social responsibilities of engineers</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Class comprises short lectures to provide essential knowledge and information on the relationships between society and the engineer under a range of dimensions.

Other methods include discussions, case studies, and seminars to develop student's in-depth analysis of the relationship.

Students form groups; throughout the course, they will work on engineering cases by completing the following learning activities:

1. Case analysis where students provide weekly summary reports on the relationships between society and the engineering issues of a project under specific dimensions;

2. The final report as a case portfolio which includes
i. Presentation slides
ii. Feedback critique
iii. Weekly summary report
iv. Reflection

3. Final presentation</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></td><td></td><td></td></tr>
<tr><td>1. Continuous assessment</td><td>60%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>• Group weekly</td><td>(24%)</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

	learning activities • Individual final presentation • Group report, individual reflection report	(18%) (18%)	✓ ✓	✓	✓			
	2. Examination	40%	✓	✓				
	Total	100%						

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

The coursework requires students to work in groups to study cases from the perspectives of the eight dimensions in an engineering setting. Through these 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 portfolio reports on the case studies.

The open-book examination is used to assess students' critical thinking and problem-solving skills when working on their own.

Student Study Effort Expected		
	Class contact:	
	▪ Lectures and review	27 Hrs.
	▪ Tutorial and presentation	12 Hrs.
	Other student study efforts:	
	▪ Research and preparation	63 Hrs.
	▪ Report writing	14 Hrs.
	Total student study effort	116 Hrs.

Reading List and References

Reference Books & Articles:

1. Education for Sustainable Development - An Expert Review of Processes and Learning, UNESCO, 2011
2. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010
3. Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, 2005
4. Securing the future: delivering UK sustainable development strategy, 2005
5. Johnston, F S, Gostelow, J P, and King, W J, 2000, *Engineering and Society Challenges of Professional Practice*, Upper Saddle River, N.J.: Prentice Hall
6. Hjorth, L, Eichler, B, and Khan, A, 2003, *Technology and Society A Bridge to the 21st Century*, Upper Saddle River, N.J.:Prentice Hall

	7. The Council for Sustainable Development in Hong Kong, http://www.susdev.gov.hk/html/en/council/ 8. Poverty alleviation: the role of the engineer, http://www.arup.com/_assets/_download/download67.pdf **Reading materials:** Engineering journals: - Engineers by The Hong Kong Institution of Engineers - Engineering and Technology by The Institution of Engineers and Technology Magazines: Time, Far East Economic Review Current newspapers: South China Morning Post, China Daily, Ming Pao Daily

Subject Description Form

Subject Code	ISE386
Subject Title	Integrated Design for Manufacture
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Exclusion : ISE3003 Design for Manufacture and Sustainability
Objectives	This subject provides students with 1. fundamental knowledge on approaches and methods of design for manufacturing; 2. the ability to realize how a design affects various product life cycle activities; 3. fundamental knowledge in designing parts and products to meet manufacturing requirements.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand how product life cycle issues affect the design of a product; b. understand the concept of customized and modular design; c. analyze a part design for manufacturability; d. apply appropriate methods in considering quality in a design stage; e. analyze a product for ease of assembly, disassembly and service.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction to Design for Product Life Cycle</u> Design for manufacture and assembly, Design for quality, Design to cost, Design for service and maintenance, Design for recycling 2. <u>Customized and Modular Design</u> Concept of value, Value analysis, Value improvement 3. <u>Quality in Design</u> Quality function deployment, Robust design 4. <u>Design for Assembly</u> Design guidelines, DFA methodology 5. <u>Design for Manufacturability</u> Part design for injection molding and sheet metal operations, Process simulation 6. <u>Design for Service and Recycling</u> Design for disassembly and service, Design for recycling

<table>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorial exercises, case studies, a group project, and laboratory exercises are used to deliver various topics on the subject. Some topics are covered in a problem-based format wherein learning objectives are enhanced, others are covered by directed studies to enhance students' "learning to learn" ability.</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>e</td><td></td></tr>
<tr><td>1. Assignments</td><td>55%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Tests</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>3. Group project</td><td>15%</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 tests and the assignments are all aimed at assessing students with respect to the intended learning outcomes. The group project is aimed at assessing students with respect to the intended learning outcomes.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>22 Hrs.</td></tr>
<tr><td>▪ Tutorials and case studies</td><td>9 Hrs.</td></tr>
<tr><td>▪ Laboratory exercises</td><td>8 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Take-home assignments</td><td>58 Hrs.</td></tr>
<tr><td>▪ Preparation for tests</td><td>25 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>122 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

1. Boothroyd, G., Dewhurst, P. and Knight, W.A. 2002, *Product Design for Manufacture and Assembly*, Marcel Dekker, N.Y.
2. Ficalora, J.P. and Cohen, L. 2010, *Quality Function Deployment and Six Sigma*, Prentice Hall
3. Wu, Y. and Wu, A. 2000, *Taguchi Methods for Robust Design*, ASME Press
4. Otto, K. and Wood, K. 2001, *Product Design*, Prentice Hall

</td></tr>
</table>

Subject Description Form

Subject Code	ME22002
Subject Title	Integrated Product Development Fundamentals
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students the knowledge for understanding the entire design process and development of a new product through a design project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Recognize the key steps in integrated product development process including identification of customer needs and market trends, concept generation and realization, assessment of alternative product design concepts, and implementation of the selected design concept. b. Apply the fundamental knowledge of product design project management and manufacturing process. c. Demonstrate team-playing and self-learning abilities and engineering communication skills through drawings and writing.
Subject Synopsis/ Indicative Syllabus	**Design and Planning Processes in Product Development -** Identification of customer needs. Product planning and development process. Formulation of a product design problem. Development of design specifications. Generation and selection of design concept. Design concept realization. Fundamentals of CAD/CAE in product design processes. **Communication in Product Design -** Representing objects and working drawings. Design project presentation skills such as oral presentation, interim and final project reports. **Understanding of Manufacturing Methods and Consideration -** Understanding materials properties, manufacturing methods, manufacturing cost consideration. **Prototyping -** Fabrication with simple hand- and machine-tools.

Teaching/Learning Methodology

This subject aims to arousing students' awareness in multiple issues encountered in product design and development. It also aims at developing interest and curiosity in all relevant subsequent subjects. The subject is taught through a combination of lectures, laboratory and tutorials.

Lectures introduce students basic knowledge in the current practices of product design and manufacturing processes. (Outcomes a – c).

Laboratory works/tutorial exercises provide opportunities for students to learn and practice with the guided study project. (Outcomes a – c).

The intended outcomes are best achieved through implementation of the design project including the prototyping process. (Outcomes a – c)

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	√	√	√
Tutorials / Laboratory works	√	√	√
Project and Prototyping	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
Assignment	25 %	√	√	√
Oral presentation	30 %		√	
Written report	40 %	√	√	√
Prototype making	5 %		√	
Total	100 %			

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

Overall Assessment:

1.0 x Continuous Assessment

Assignment is used to assess the understanding of the students on the entire process and fundamental knowledge involved in the design and development of a new product. The written report is a final report of all the task activities and technical analysis involved in the project. Each group prepares a written report, with individual contributions indicated. Oral presentations are required so that students can orally present the progress and findings.

Student Study Effort Expected	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Tutorial/ Case Study	9 Hrs.
	▪ Laboratory/ Workshop	6 Hrs.
	Other student study effort:	
	▪ Preparation and performing project	36 Hrs.
	▪ Workshop practice	18 Hrs.
	▪ Self-study	21 Hrs.
	Total student study effort	114 Hrs.
Reading List and References	1. Baxter, Mike, *Product design : a practical guide to systematic methods of newproduct development*, Chapman & Hall, latest edition. 2. Dym, Clive L, *Engineering design: a project-based introduction*, John Wiley, latest edition. 3. Earle, James H, *Engineering design graphics : AutoCAD*, Prentice Hall, latest edition. 4. Hyman, B, *Fundamentals of engineering design*, Prentice Hall, latest edition. Dieter, G E, *Engineering Design: a materials and processing approach*, McGraw-Hill, latest edition.	

Subject Description Form

Subject Code	MM2711
Subject Title	Introduction to Marketing
Credit Value	3
Level	2
Normal Duration	1-semester
Exclusion	**Exclusion**: Marketing and the Consumer (MM2791) or Introduction to Marketing (MM2B05) or equivalent
Role and Purposes	This core subject introduces the basic principles and concepts of Marketing. It provides an analytical foundation for further study of Marketing and also contributes to the BBA Programme Outcomes in two ways. First, the content directly addresses the creation of value (Outcome 8), ethics (Outcome 4), cultural diversity and globalization (Outcome 2). Second, the classroom activities and assessments develop students' teamwork, ability to communicate in English, analyse business situations by applying relevant conceptual frameworks (Outcomes 10) and creative thinking (Outcome 3).
Subject Learning Outcomes	Upon completion of the subject, students will be able to: (a) Analyse diverse marketing situations and identify marketing opportunities and threats (**BBA Outcomes 2 & 10**); (b) Apply marketing theories and models to practical marketing situations (**BBA Outcome 10**); (c) Evaluate ethical issues from a marketing perspective and suggest appropriate actions (**BBA Outcome 4**); (d) Analyse and/or suggest ways to create value in goods and services and deliver these to customers (**BBA Outcomes 3 and 8**); (e) Critically select and manage information, develop and present coherent arguments on marketing issues.
Subject Synopsis/ Indicative Syllabus	**Overview of Marketing** What is marketing and why is it important? The marketing process **Developing Marketing Strategies and a Marketing Plan** The marketing plan and strategic planning tools **Marketing and Society** Marketing's impact on individual consumers, society and other businesses Marketing ethics and corporate social responsibility **UNDERSTANDING THE MARKET** **Analyzing the Marketing Environment** The company's macro- and micro- environment **Consumer Behaviour** The consumer decision making process

	Types of buying decision behaviour Factors affecting consumer behaviour: cultural, social, personal, psychological Adoption of new products **Business Buying Behaviour** Business to business markets Business buyer behaviour Factors affecting the buying process: buying centre, buying situations Role of the internet in business-to-business marketing **Marketing Research and Information Systems** The marketing research process Marketing information systems **VALUE CREATION** **Market Segmentation, Targeting and Positioning** Benefits of segmentation Segmentation bases The segmentation process The positioning process and repositioning **Product and Services** Product Lifecycle Branding Characteristics of services and their implications for marketing **Price** Considerations affecting pricing decisions Major pricing strategies New product pricing: skimming and penetration pricing Price adjustment strategies **Distribution** Nature and importance of marketing channels Channel design decisions: channel structure, distribution intensity Channel management **Promotion** The communication process AIDA model Importance of integrated marketing communications Designing the promotion mix Setting the promotion budget
Teaching/Learning Methodology	The two-hour weekly lecture aims to guide and promote students' understanding of relevant concepts. The weekly one-hour tutorial activities include discussions on case studies, contemporary marketing topics and journal articles. Students will also work in groups to prepare and make presentations, and to critique the work presented by others. Emphasis is placed throughout on the application of theory to the solution of practical and realistic marketing problems in the local and global setting.

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	
Continuous Assessment	**50%**						
1. Individual essay	15%			✓		✓	
2. Group project(s) and presentation	25%	✓	✓	✓	✓	✓	
3. Individual contribution to class discussions	10%					✓	
Examination	**50%**	✓	✓		✓	✓	
Total	100 %						

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

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

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: the above methods are designed to ensure that all students -

- Read the recommended material;
- Discuss the issues brought up in the lectures/seminars;
- Appreciate the different approaches that may be adopted in solving marketing problems and
- Participate in presenting the group's views on a case/marketing situation.

Feedback is given to students immediately following the presentations. All students are also invited to join the discussion.

Student Study Effort Required

Class contact:	
▪ Lectures	26 Hrs.
▪ Seminars	13 Hrs.
Other student study effort:	
▪ Preparation for tutorials and presentation	26 Hrs.
▪ Reading and essay writing	21 Hrs.

	▪ Self study in preparation for exam	40 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	*Recommended Textbook* Kotler, P., Armstrong, G., Ang, S.H., Leong, S.M., Tan, C.T., Yau, O.H.M. (2011) ***Principles of Marketing: An Asian Perspective***, 3rd Edition, Singapore, Pearson Education South Asia. *References* Kerin, R. A., Hartley, S. W., Rudelius, W. and Lau, G.T. (2012), ***Marketing in Asia***, Singapore, McGraw-Hill. Grewal, D. and Levy, M. (2012) ***Marketing***, 3rd Edition, New York, McGraw-Hill. Various newspapers, magazines, journal articles and web addresses will be referenced.	

Subject Description Form

Subject Code	SD348
Subject Title	Introduction to Industrial Design
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject gives an introduction to the field of industrial design as a creative discipline, a discipline which synthesises knowledge from fields as diverse as e.g. the Arts, the Sciences and Engineering. Industrial Design is known for its capacity to innovate and to add value to products and services. Industrial designers solve problems centred on user needs with the intent to improve the quality of people's lives. The design process incorporates unique problem solving methods and creativity process. Industrial design intends to work with technological and ecological parameters in an appropriate way. The development and use of state of the art tools and technologies puts industrial design in a significant position socially and economically. The subject aims to equip students with knowledge and experience of industrial design to appreciate the profession, relate to its practitioners in different work situations, employ the design process appropriately for problem identification, solving and innovation, and to realise the importance of a user centred approach to the creation of new products and services. The subject does not include any engineering skill, such as software application. Thus, the students are expected to apply the technological and engineering knowledge, skills and experience obtained from other subjects to tackle the project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to basic knowledge to: a. Appreciate the industrial/product design profession, relate to its practitioners in different work situations. b. Employ the design process appropriately for problem solving and innovation. c. Realise the importance of a user centered approach to the creation of new products and services. d. Apply visualisation skill in project presentation. e. Understand objectives of industrial/product design, and apply knowledge and experience in other related subjects and future career.

Subject Synopsis/ Indicative Syllabus

The field of industrial design is introduced through a series of lectures featuring a review of milestones of design achievements internationally and locally. The relationships between design, culture and society are highlighted through a look at topics like cultural identity in product design, user centred design, employment of technologies, and design and sustainability.

Further lectures and seminars cover two major parts of industrial design and its professional practice:

1. The essentially theoretical foundation of the industrial design process and methodology covering topics such as:
   - Design and culture
   - Form, aesthetics and semantics
   - Human factors and ergonomics in design
   - Research and problem identification
   - Design requirements and design brief
   - Design development and specifications
   - Design evaluation and concept selection

2. The essentially practical aspects of the industrial design process covering topics such as:
   - Design visualisation, presentation and communication
   - Product prototyping and user testing
   - Manufacturer and marketing relations

Teaching/Learning Methodology

Emphasis in the practical learning activities is placed on students' creativity in relation to designing. Students explore different approaches to problems and experience methods of problem solving with the designer's tools.

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	
1. Design project: Understanding design process	10	✓	✓	✓	✓	✓	
2. Design project: investigation and application in design	30		✓	✓		✓	
3. Design project: development of design ideas	45	✓	✓	✓	✓	✓	

	4. Design project: presentation of design ideas	15				✓	✓	
	Total	100 %						

Project and continuous assessment approaches are adopted in the subject.

Student Study Effort Required		
	Class contact:	
	▪ Lectures and seminars	26 Hrs.
	▪ Tutorials and exercises	13 Hrs.
	Other student study effort:	
	▪ Research and design	31 Hrs.
	▪ Preparation of presentation	10 Hrs.
	Total student study effort	80 Hrs.

Reading List and References

1. *Design Issues. The MIT Press. (Journal)*
2. *Design Management Journal. The Design Management Institute. (Journal)*
3. *Design Studies. Elsevier Science. (Journal)*
4. *International Journal of Design (Journal)*
5. *The Design Journal (Journal)*
6. *Fung, A., Lo, A., & Rao, M. N. (2005). Creative tools. Hong Kong: School of Design, The Hong Kong Polytechnic University.*
7. *Graedel, T. E. (2003). Industrial ecology (2nd ed.). Upper Saddle River, NJ: Prentice Hall.*
8. *Jordan, P. W. (1997). Putting the pleasure into products. IEE Review, Nov. 1997, 249-252.*
9. *Leung, T. P. (Ed.) (2004). Hong Kong: Better by design. Hong Kong: The Hong Kong Polytechnic University.*
10. *Mackenzie, D. (1997). Green design: Design for the environment (2nd ed.). London: Laurence King.*
11. *Norman, D. A. (1998). The invisible computer: Why good products can fail, the personal computer is so complex and information appliances are the solution. Cambridge, Mass., London: The MIT Press.*
12. *Norman, D. A. (1998). The design of everyday things. London: The MIT Press.*
13. *Roqueta, H. (2002). Product design. London: Te Neues.*
14. *Rowe, P. G. (1987). Design thinking. Cambridge, Mass.: The MIT Press.*
15. *Siu, K. W. M. (Ed.) (2009). New era of product design: Theory and practice (Chinese ed.) Beijing: Beijing Institute of Technology Press. 邵健偉 編著 (*

	2009）：《產品設計新紀元：理論與實踐》。北京：北京理工大學出版社。 16. *Stanton, N. (Ed.) (1998). Human factors in consumer products. London: Taylor & Francis.* 17. *Ulrich, K. T. (2004). Product design and development (3rd ed.). New York, NY: McGraw-Hill/Irwin.* 18. *Wang, S. Z. (1995). A history of modern design 1864-1996. Guangzhou: Xin Shi Ji Chu Ban She.* 19. *Whiteley, N. (1993). Design for society. London: Reaktion Books.*

Subject Description Form

<table>
<tr><td>Subject Code</td><td>BME31125</td></tr>
<tr><td>Subject Title</td><td>Biomechanics</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>3</td></tr>
<tr><td>Pre-requisite / Co-requisite/ Exclusion</td><td>BME21119 Fundamentals of Biomechanics, or equivalent</td></tr>
<tr><td>Objectives</td><td>Biomechanics is one of the most important supporting subjects for the principles and practices of health technology. This subject aims to apply the mechanical principles extensively in the biomechanical context.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:

1. Apply kinematics and kinetics to load and motion analysis for human body supports and musculoskeletal system;
2. Explain how our bodies, in particular the musculoskeletal system, function
3. Demonstrate understanding of tissue properties, especially viscoelasticity
4. Describe the structure-property-function relationship of biological tissues.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Fundamentals of mechanics, inverse dynamics, human joint load analysis, fundamentals of human movement analysis, application to musculoskeletal system and body support system, mechanical properties of biological tissues (bone, muscle, tendon, ligament, and other connective tissues), viscoelasticity, bone fracture and fixation, responses of biological tissues to their mechanical environment, and stress-strain relationship.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>There will be lectures and tutorials dealing with fundamental mechanics and application examples on human body. Students' knowledge is tested by home assignments, lab report, midterm quiz, and final examination.</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>1. Continuous assessment (including home assignments</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>
</td></tr>
</table>

	and class quiz)							
	2. Final examination	60%	✓	✓	✓	✓		
	Total	100 %						

Note: To pass this subject, students must obtain grade D or above in both continuous assessment and final examination

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

All the continuous assessments and final examination will be designed to assess the three outcomes.

Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	54 Hrs.
	▪ Assignments and preparation for presentation	39 Hrs.
	Total student study effort	132 Hrs.

Reading List and References

1. Nordin M and Frankel VH, ed., Basic Biomechanics of the Musculoskeletal System, Lea & Febiger, Philadelphia, 1989 or 2001
2. Ozkaya N and Nordin M, Fundamentals of Biomechanics: Equilibrium, Motion, and deformation, Van Nostrand Reinhold, New York, 1999.
3. Nigg BM and Herzog W, Biomechanics of the Musculoskeletal System, Wiley, New York, 2008.
4. Mow VC and Hayes WC, Basic Orthopaedic Biomechanics, Raven Press, New York, 1991.
5. Riley WF, Sturges LD and Morris DH, Statics and Mechanics of Materials, John Wiley & Sons Inc., 1996.

Subject Description Form

Subject Code	EE2901S
Subject Title	Basic Electricity and Electronics
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the basic concepts and fundamental principles of electric circuits and machines applicable to ME students. 2. To develop an ability for solving problems involving electric circuits and machines. 3. To develop skills for experimentation on electric circuits. 4. To impart relevant skills and knowledge in basic electricity and electronics for independent learning of other subjects that requires such skills and knowledge.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. Understand the basic concepts of dc and ac electric circuits. 2. Solve simple problems using circuit analysis techniques. 3. Understand the fundamental principles of analog electronic and digital logic circuits. 4. Understand the operating principles of electric machines. 5. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations.
Subject Synopsis/ Indicative Syllabus	**DC Circuit Analysis —** Basic electric quantities: charge, potential, current, voltage and power. Sign conversion. Lumped circuit elements. Linear resistor, Ohm's law and simple resistor circuits: series and parallel circuits, voltage and current dividers. Voltage and current sources: ideal and practical sources, independent and dependent sources. Power absorption and delivery. Network description: branch, node, loop and mesh. Kirchhoff's voltage and current laws. Tellegen's theorem. Mesh-current and node-voltage methods. Thévenin and Norton theorems. Source loading and maximum power transfer. **Capacitance, Inductance and First-Order Transients —** Constitutive relations of capacitor and inductor. Introduction to time-varying circuits. Simple *RC* and *LC* circuits. Independent state variables. First-order differential equation (with solution in exponential form). First-order transient analysis. Time-domain solution and transient behavior of first-order circuits. Time constant. **AC Circuit Analysis —** Time-dependent and sinusoidal sources. Periodic signals. Average and rms values. Steady-state analysis: sinusoidal function

	of time. Phasors and phasor diagrams. Impedance and admittance. Steady-state analysis: phasor approach. Instantaneous, average and complex powers. Power factor. Three-phase power and circuits. **Analog Electronic Circuits —** Diodes and diode circuits: semiconductor materials and properties, properties of a p-n junction, characteristics of a p-n junction diode, basic diode circuits, load line concept. Bipolar junction transistors (BJT) and BJT circuits: basic structures, modes of operation, BJT amplifiers, dc biasing and analysis, ac small signal and analysis, load lines. **Digital Logic Circuits —** Binary number systems: addition, subtraction, multiplication and division. Conversion between binary and decimal numbers. Two's complement. Boolean algebra. Basic logic gates. Karnaugh maps. Don't care condition. Combinational logic circuit design and modules. **Electrical Machines —** Basic coupled inductance equation. Concept of ideal transformer. Dot conversion. Applications in voltage/current level conversion and galvanic isolation. DC machines: construction, generator and motor actions, emf, torque equations. Three-phase induction motors: construction, generation of rotating magnetic fields and torque-slip curve. **Laboratory Experiments:** 1. EE2901S-E01: Kirchhoff's Laws, Equivalent Resistance and Maximum Power Transfer Theorem. 2. EE2901S-E02: Transients in *RC* & *RL* Circuits. 3. EE2901S-E03: Use of NAND Gates.
Teaching/Learning Methodology	Lecture: Students are introduced to the knowledge of the subject and the comprehension is strengthened with interactive Q&A (outcomes 1 to 4). Tutorial: Students apply what they have learnt in solving the problems given by the tutor (outcomes 1 to 4). Assignment: Students will develop a firm understanding and comprehension of the knowledge taught (outcomes 1 to 4). Laboratory: Students acquire hands-on experience in using electronic equipment and apply what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations (outcome 5).

Teaching/Learning Methodology	Outcome				
	1	2	3	4	5
Lecture	✓	✓	✓	✓	
Tutorial	✓	✓	✓	✓	
Assignment	✓	✓	✓	✓	
Laboratory					✓

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. Continuous Assessment	50%	✓	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓	
Total	100 %					

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

Overall Assessment:

$$0.5 \times \text{Continuous Assessment} + 0.5 \times \text{End of Subject Examination}$$

Examination is adopted to assess students on their overall understanding and the ability of applying the concepts. It is supplemented by the mid-term class tests and regular quizzes which provide timely feedbacks to both lecturers and students on various topics of syllabus. Experiment logbooks and reports reflect the students' laboratory skills, usages of appropriate equipment and data analysis on experiment results.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial	9 Hrs.
▪ Laboratory	9 Hrs.
Other student study effort:	
▪ Self-study	32 Hrs.
▪ Assignment	12 Hrs.
▪ Laboratory logbook & report writing	8 Hrs.
Total student study effort:	100 Hrs.

Reading List and References	**Textbooks:** 1. G. Rizzoni, *Principles and Applications of Electrical Engineering*, 5th Edition, New York: McGraw-Hill (2006) 2. Donald A. Neamen, *Microelectronics: Circuit Analysis and Design*, 3rd Edition, Boston: McGraw-Hill (2006). **References:** 1. W. H. Hayt, J. E. Kemmerly and S. M. Durbin, *Engineering Circuit Analysis,* 7th Edition, New York: McGraw-Hill (2006). 2. A. H. Robbins and W. C. Miller, *Circuit Analysis: Theory and Practice*, 4th Edition, Thomson Learning (2006). 3. C. K. Tse, *Linear Circuit Analysis*, London: Addison-Wesley (1998). 4. R. A. DeCarlo and P. M. Lin, *Linear Circuit Analysis*, 2nd Edition, Oxford University Press (2001).

Subject Description Form

Subject Code	ME23001
Subject Title	Engineering Mechanics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students the fundamental concepts of mechanics of motion and system equilibrium.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Apply the fundamental knowledge of mechanics to solve for forces and moments on simple systems. 2. Distinguish the basic differences between diverse engineering systems, and select the suitable design in achieving the engineering purposes. 3. Employ state-of-art technology in solving mechanics problems encounter in assignments and projects. 4. Collaborate with peers from different disciplines in experiments and projects and present effectively the results of experiment or project.
Subject Synopsis/ Indicative Syllabus	*Fundamentals of Mechanics* - Basic concepts of mechanics. Scalar and Vectors: Vector algebra and vector components. Position, unit and force vectors. Two and three-dimensional force systems. Moment of a force about a point. Moment of a force about a line. *Dynamics* - Kinematics and kinetics of particles, rectilinear motion, plane curvilinear motion, relative motion, equation of motion. *Statics* - Equilibrium of a particle and the associated free-body diagrams. Equilibrium of a rigid body and the associated free body diagram. Two and three force members equilibrium in three dimensions. Simple trusses: The method of joints; the method of sections; zero-force members; the method of sections. Internal forces developed in structural members. Shear and moment equations and diagrams. Relations between distributed load, shear and moment. Theory of dry friction. Systems with friction. Wedges. Belt friction. Rolling resistance. *Equivalent Systems* - Determination of the resultant concurrent forces. Equivalent force/couple systems. Centre of gravity and centroid: by composite parts; by integration. Resultant of a general distributed force system. Moment of inertia of areas. Parallel-axis theorem for an area. Radius of gyration of an area. Calculation of moments of areas: by composite areas; by integration. Product of inertia for an area. Principles of virtual work.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to the topics as described in the section subject synopsis (Outcomes a, b and c).

Tutorials are used to illustrate the application of fundamental knowledge to practical situations (Outcomes a, b and c).

Experiments are used to relate the concepts to practical applications and students are exposed to hand-on experience, proper use of equipment and application of analytical skills on interpreting experimental results (Outcomes c and d).

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√	√	
Tutorial	√	√	√	
Experiment			√	√

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. Assignment	20%	√	√	√	√
2. Test	20%	√	√	√	
3. Examination	60%	√	√	√	
Total	100%				

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

Overall Assessment:

0.60 × End of Subject Examination + 0.40 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, assignments and laboratory reports which provide timely feedbacks to both lecturers and students on various topics of the syllabus.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Laboratory	6 Hrs.
	Other student study effort:	
	▪ Course work	23 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	104 Hrs.

Reading List and References	1. R.C. Hibbeler, Engineering Mechanics – Statics, Prentice Hall, latest edition. 2. A. Pytel, J. Kiusalaas, Engineering Mechanics – Statics, Stamford, CT : Cengage Learning, latest edition.

Subject Description Form

Subject Code	ME31003
Subject Title	System Dynamics
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME23001 Engineering Mechanics
Objectives	To provide students the knowledge in modeling and solving different dynamic systems including plane kinematics and kinetics of rigid bodies through theoretical and mathematical principles.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Construct and analyze the dynamic models of different physical systems by applying knowledge of physical laws and mathematical techniques. b. Formulate and analyze the mechanical translational and rotational systems by applying knowledge of rigid body dynamics. c. Complete a given task in modeling and analysis of dynamic systems such as an assignment or a project by applying concepts and knowledge in system dynamics, mathematical and simulation tools. d. Present effectively in completing written reports of a given task.
Subject Synopsis/ Indicative Syllabus	***Dynamics*** - *Plane kinematics of rigid bodies*, rotation, absolute motion, relative velocity, instantaneous centre of zero velocity, relative acceleration, motion relative to rotating axes. *Plane kinetics of rigid bodies*, force, mass and acceleration, general equation of motion, applications, e.g., four-bar linkage and slider-crank mechanisms, principles of work, energy, impulse and momentum. ***Modelling of Linear Systems*** – Dynamic equations of multi-degrees-of-freedom spring-mass-damper systems, liquid level systems, temperature systems and some hybrid systems; introduction to Laplace transform and analysis of vibration systems; block diagram construction and simplification; Transfer functions; Characteristic equations, Zeros and poles; Transient responses of 1st and 2nd order systems.
Teaching/Learning Methodology	Lectures aim at providing students with an integrated knowledge required for understanding and analyzing the dynamics of rigid bodies and systems. (Outcomes a to c) Tutorials aim at enhancing the analytical skills of the students. Examples will be provided to teach students the skill of modelling dynamic systems and determining their response. Students will be able to solve real-world problems using the knowledge they acquired in the class. (Outcomes a to c)

	The task aims to integrate the sciences of different physical systems to the analysis of a dynamic system, which provides opportunity to apply knowledge of system dynamics, mathematical and simulation tools to design a real-life product or system. (Outcomes a to d)

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√	√	
Tutorial	√	√	√	
Task (Assignment/Project)	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Class test	30%	√	√		
2. Homework/Task	20%	√	√	√	√
3. Examination	50%	√	√		
Total	100%				

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

The continuous assessment includes two components: three closed-book short tests (30%) and three assignments or task (20%). The closed-book tests aim at assessing the interim knowledge gained by the student. The assignments aim at assisting the students in preparation for the tests and checking the progress of their study.

The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems, critically and individually, related to modeling and analysis of linear dynamic systems.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	32 Hrs.
	▪ Tutorial	7 Hrs.
	Other student study effort:	
	▪ Reading and review	42 Hrs.

	▪ Homework assignment and task	24 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. F.P. Beer and E.R. Johnson, Mechanics for Engineers: Dynamics, McGraw-Hill, latest edition. 2. J.L. Meriam and L.G. Kraige, Engineering Mechanics, John Wiley, latest edition. 3. N.S. Nise, Control Systems Engineering, Wiley, latest edition. 4. K. Ogata, Modern Control Engineering, Prentice Hall, latest edition.	

Subject Description Form

Subject Code	ME33001
Subject Title	Mechanics of Materials
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME23001 Engineering Mechanics
Objectives	To introduce the fundamental mechanics knowledge of solid materials under basic loading conditions. And to introduce practical approaches to solve for the stress and strain/deformation of solid materials under external mechanical loadings.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Solve for external forces and moments applied on a structure and determine the distribution of internal forces and moments in the structure by using free body diagrams and the laws of equilibrium. b. Recognize the crucial material and geometrical properties for a structural component under different types of loading, and solve for stress and deformation in a structural component due to axial loading, torsion, and bending acting individually or in combination. c. Evaluate the principal stresses in structural components subjected to a combined state of loading. d. Formulate and solve problems involving tension, compression, torsion or bending for statically indeterminate structural components.
Subject Synopsis/ Indicative Syllabus	*Fundamentals* - Free Body Diagram; Equilibrium of a deformable body; General state of stress; Strain; Mechanical properties of materials. *Axial Load* - Saint-Venant's Principle; Axial elastic deformation; Principle of superposition; Statically indeterminate axially loaded member; Thermal stress. *Torsion* - Torsional deformation; Torsional Stress; Angle of twist; Statically indeterminate torque-loaded members. *Bending* - Equilibrium of beams; Shear force and bending moments; Flexural stresses; Beam deflection; Slope and deflection by method of superposition; Statically indeterminate systems. *Combined Loading* - Transformation of stresses; Principle stresses and maximum shear stress; Mohr's circle. Thin walled pressure vessels; Cylinders and spheres under internal and external pressures; Compounded cylinder; Stress distribution in beams; Stresses due to combined loads.

Laboratory Experiment
There are two 2-hour laboratory sessions.
Typical Experiments:
1. Torsion test
2. Deflection of beam

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to the topics as described in the section subject synopsis (Outcomes a to d).

Tutorials are used to illustrate the application of fundamental knowledge to practical situations (Outcomes a to d).

Experiments are used to relate the concepts to practical applications and students are exposed to hand-on experience, proper use of equipment and application of analytical skills on interpreting experimental results (Outcomes a and d).

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√	√	√
Tutorial	√	√	√	√
Experiment	√			√

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. Assignment	25%	√	√	√	√
2. Laboratory report	5%	√			√
3. Test	10%	√	√	√	√
4. Examination	60%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.60 \times$ End of Subject Examination + $0.40 \times$ Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, assignments and laboratory reports which provide timely feedbacks to both lecturers and students on various topics of the syllabus.

Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Laboratory	6 Hrs.
	Other student study effort:	
	▪ Course work	23 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	104 Hrs.
Reading List and References	1. R.C. Hibbeler, Mechanics of Materials, Pearson Prentice Hall, latest edition. 2. F.P. Beer, E.R. Johnston and Jr. J.T. DeWolf, Mechanics of Materials, McGraw-Hill, latest edition. 3. A.C. Ugural, A.C. and S.K. Fenster, Advanced Strength and Applied Elasticity, Prentice Hall, latest edition.	

Subject Description Form

Subject Code	ME34003
Subject Title	Thermofluid Mechanics
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AP10005 Physics I
Objectives	1. To provide fundamental concepts and knowledge of fluid mechanics, acoustics and heat transfer. 2. To provide fundamental concepts and knowledge of internal and external flow systems, pump and fan systems, heating and cooling systems and their applications to product design.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate and solve fluid-mechanic/heat-transfer/acoustic problems by applying knowledge of thermofluids, heat transfer, acoustics and mathematics. b. Complete a design project of a thermofluid system by applying knowledge acquired in the subject with the aid of computer technology. c. Analyze and interpret data obtained from experiments in fluid mechanics, acoustics and heat transfer. d. Search for updated technology in thermofluid engineering in completing a design project of a thermofluid system. e. Communicate effectively in completing written reports of laboratory work and design project.
Subject Synopsis/ Indicative Syllabus	*Fluid Mechanics* – Basic concepts. Fluid pressure and manometers. Bernoulli, energy and momentum equations. Pitot tubes. Laminar and turbulent flow in pipes. Moody chart, frictional and minor losses. Design for pipes in parallel and in series. Pump matching in pipe flow system. Parallel flow over flat plates, flow over cylinders and spheres. Dimensional Analysis. Buckingham π theorem. Flow similarity and modeling. *Flow Generation* – Conservation of angular momentum and working principles of fluid machinery. Performance characteristics of fans, pumps and blowers and their design selections. Engineering estimates of the working point of the fluid machines in products. *Heat Transfer* – Revision: basic heat transfer modes; one-dimensional steady state heat conduction in plane walls and cylinders; electrical analogy method. Thermal insulation. Critical thickness of insulation. Fins. Natural convection over surfaces. Forced convection over flat plates and in pipes. Heat exchangers. Thermal, blackbody and gray body radiations. View factors. Radiative exchange between surfaces in enclosures.

<table>
<tr><td></td><td>Noise – Sound pressure and sound power levels. Point source models. Common noise source mechanisms involving flow and vibration and their sound power laws. Simple noise control design.

Experimental Work
There are two 2-hour laboratory sessions with the following typical experiments:
1. Flow pattern at exit of a hair dryer
2. Heat transfer via a heat sink
3. Natural convection and radiation heat transfer
4. Noise control technique</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The subject intends to lay a solid scientific foundation for the design and analysis of a product in which thermofluid sciences play a crucial role. Systematic lectures are required to achieve such foundation building coupled with assignments (outcomes a, and b).
2. Tutorials are used to illustrate the applications of fundamental knowledge to practical situations (outcomes a, b, and d).
3. Laboratory works are essential for students to have hands-on experience of the thermofluid systems to be learned (outcomes c and e).
4. The design project aims to integrate the thermofluid sciences to engineering design of a thermofluid system, and this design task provides opportunity to apply knowledge of mathematics, thermofluid sciences and acoustics to design a real-life product (outcomes a, b, d and e).

It is intended to make use of these teaching/learning methodologies to achieve the intended subject learning outcomes as indicated in the following table:

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="5">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>Lecture</td><td>√</td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>Tutorial</td><td>√</td><td>√</td><td></td><td>√</td><td></td></tr>
<tr><td>Experimental Work/Report</td><td></td><td></td><td>√</td><td></td><td>√</td></tr>
<tr><td>Design Project/Report</td><td>√</td><td>√</td><td></td><td>√</td><td>√</td></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	50%	√	√			
2. Test	25%	√	√			
3. Assignments	7.5%	√			√	
3. Design Project/Report	10%	√	√		√	√
4. Laboratory Work/Report	7.5%			√		√
Total	100%					

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

Overall Assessment:

$$0.5 \times \text{End of Subject Examination} + 0.5 \times \text{Continuous Assessment}$$

Examination is adopted to assess students on their overall understanding and ability in applying the concepts and knowledge of thermofluid mechanics. It is supplemented by homework assignments, design project/report and laboratory works/reports. The mid-term test which covers the first half of the course materials provides useful timely feedback to both lecturer and the students on the topics.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/laboratory	6 Hrs.
	Other student study effort:	
	▪ Coursework (Assignments, Design Project/ Laboratory Works and Reports)	39 Hrs.
	▪ Self Study	39 Hrs.
	Total student study effort	117 Hrs.
Reading List and References	1. Cengel Y.A., Turner R. H. and Cimbala J. M., Fundamentals of thermal-fluid sciences. McGraw Hill, latest edition. 2. Holman J. P., Heat Transfer, McGraw Hill, latest edition. 3. Wright T., Fluid machinery: performance, analysis, and design, CRC Press, latest edition. 4. Munson B. R., Young D. F., Okiishi T. H., Huebsch W. W., Fundamentals of Fluid Mechanics, John Wiley, latest edition. 5. Barron, R. F., Industrial Noise Control and Acoustics, Marcel Dekker Inc., latest edition.	

Subject Description Form

Subject Code	ME41004
Subject Title	Mechatronics and Control
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME31003 System Dynamics
Objectives	To provide students the knowledge in designing mechatronic systems for product development which integrate mechanical, electrical and control systems engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate and solve problems relating to modeling of linear mechanical systems, analysis of system relative stabilities; determining specifications for mechantronic products, designing controllers for mechanical products, or analyzing mechatronic products. b. Complete a given task such as a project in product design and/or improvement by applying knowledge acquired in the subject and information obtained through literature search. c. Analyze and interpret data obtained from experiments in system modeling, stability analysis or frequency-domain analysis of mechanical products. d. Present effectively in completing written reports of laboratory work and the given task.
Subject Synopsis/ Indicative Syllabus	*Sensors and Actuators* - Instrumentation and measurement principles; frequency response characteristics; sensors for motion and position measurement; force, pressure and acceleration sensors, *etc*; actuators such as direct current motors, stepper motors, piezoelectric actuators, *etc.* *Signal Conditioning and Transmission* - Concepts and principles; analogue electronics with operational amplifier; conversion between analog and digital signals, multiplexing; data acquisition principles, signal filtering. *Digital Logic Controller and PLC* - Logic; controller design in mechatronic system integration, combinational and sequential control, minimization of logic equations; ladder logic diagrams; introduction to microcontrollers and programmable logic controllers (PLC). *Introduction to Feedback Control* – Analysis of open-loop and closed-loop systems; transfer functions and block diagrams, time-domain specifications such as overshoot, settling time, steady-state error etc. *Feedback Control Systems* – Automatic controllers, basic P, PD, PI, PID

controllers, Routh-Hurwitz stability criterion, controller design to satisfy the design specifications.

Laboratory Experiment
There are two 2-hour laboratory sessions.
Typical Experiments:
1. Speed Measurement
2. Sequential control using programmable logic controller (PLC)
3. DC servomechanism
4. Water level control

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to sensors and actuators, signal conditionings, digital logic controllers, feedback control systems and stability analysis (Outcomes a and b).

Tutorials are used to illustrate the application of fundamental knowledge to practical situation (Outcomes a and b).

Experiments are used to relate the concepts to practical applications and students are exposed to hand-on experience, proper use of equipment and application of analytical skills on interpreting experimental results (Outcomes c and d).

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√		
Tutorial	√	√		
Experiment			√	√

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. Class Test	25%	√	√		
2. Homework	15%	√	√		
3. Laboratory	10%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

	Overall Assessment: 0.50 x End of Subject Examination + 0.50 x Continuous Assessment. Assignments, laboratory reports, and tests are adopted in continuous assessment on students' timely feedback to and on-going understanding of the course. Students' overall understanding of the course and ability in applying the delivered knowledge are further assessed through a formal examination.	
Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Laboratory / Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	45 Hrs.
	▪ Homework assignment	15 Hrs.
	▪ Laboratory report	6 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Shetty, D. and Kolk, R. A., *Mechatronic System Design*, PWS Publishing Company, latest edition. 2. Alciatore, D. G. and Histand, M. B., *Introduction to Mechatronics and Measurement Systems*, McGraw Hill, latest edition. 3. Bolton, W., *Mechatronics: Electronic Control Systems in Mechanical Engineering*, Prentice Hall, latest edition. 4. Ogata, K., *Modern Control Engineering*, Prentice Hall, latest edition. 5. Gopal, M., *Control Systems Principles and Design*, Tata McGraw-Hill, latest edition. 6. Nise, N.S., *Control Systems Engineering*, John Wiley, latest edition.	

Subject Description Form

Subject Code	ME42005
Subject Title	CAD/CAE Technologies for Product Development
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111 Mathematics I
Objectives	To provide students with computer-aided design (CAD) and computer-aided engineering (CAE) technologies and the ability in using CAD and CAE software for product design and development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Use CAD and CAE technologies to support product design activities, including geometry modeling, design solution modeling, analysis and evaluation, in different design process of the whole product design and development cycle. b. Understand data exchange standards and practices between CAD and CAE models and systems and their interoperability and associativity. c. Use CAD and CAE commercial software systems for product design and development in terms of geometry modeling, kinetics simulation, design solution analysis and evaluation. d. Optimize design solutions with the aid of CAD and CAE technologies.
Subject Synopsis/ Indicative Syllabus	*Computer-aided Design* - Geometric Models of Products • Wireframe model • Surface model • Solid Model - Geometry modeling technologies • Curve Modeling • Surface Modeling • Solid Modeling - Product kinetics modeling and simulation *Design Analysis and Evaluation* - Finite Element Modeling and Analysis • Basic concept of finite element method • Modeling techniques • Mesh types • Boundary constraints • Material and Properties • Symmetry in modeling and analysis - Mechanical and thermal stress analyses - Dynamic response

<table>
<tr><td></td><td>
- Product optimization in terms of product size, shape and material
- Non-linear stress analysis

CAD/CAE Integration
- Data exchange standards: STL, STEP and IGES
- Interoperability and associativity between CAD and CAE
- Model defect and repairing

Case Studies
- CAD case studies
- CAE case studies
- CAD and CAE integration
</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
Lectures will be given to explain the theories behind CAD and CAE and their applications. (Outcomes b, c and d)

Tutorials will be used to teach the students on how to conduct product design, analysis and evaluation using state-of-the-art CAD and CAE software commercial software systems. Students will be given various assignments to learn how to represent and model the products from geometry perspective, how evaluate and analyze the design solutions from thermal, mechanical and physical perspectives and how to optimize the design solutions in terms of product size, shape and material. (Outcomes a, c and d)

A mini-project will be given to students so that they will go through all the design phases in using computer-aided technologies to achieve design objectives. (Outcomes a to d)

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>Lecture</td><td></td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Tutorial</td><td>√</td><td></td><td>√</td><td>√</td></tr>
<tr><td>Case study</td><td></td><td></td><td>√</td><td></td></tr>
<tr><td>Mini-project</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
</table>
</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. Class test</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Written/computer assignment</td><td>10%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Case study</td><td>10%</td><td></td><td></td><td>√</td><td></td></tr>
</table>
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</table>

	4. Mini-project report/presentation	10%	√	√	√	√
	5. Examination	50%	√		√	√
	Total	100%				

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

Overall Assessment:
0.50 × End of Subject Examination + 0.50 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, written and computer assignments which provide timely feedbacks to both lecturers and students on various topics of the syllabus. Written reports on various case studies and mini-project are used to assess the students' knowledge in the application of state-of-the-art CAD/CAE software to facilitate the product design and analysis process.

Mini-project report and presentation assess the students' ability to assimilate the learnt knowledge for solving a more realistic, open-ended design problem systematically.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial	3 Hrs.
	▪ Guided study of CAD/CAE	6 Hrs.
	Other student study effort:	
	▪ Performing CAD/CAE in design (tutorial problems)	20 Hrs.
	▪ Performing modeling of design problems (case studies and mini-project)	24 Hrs.
	▪ Literature search and private study	23 Hrs.
	Total student study effort	106 Hrs.

Reading List and References

1. Michael E. Mortenson, Geometric Modeling, John Wiley & Sons, latest edition.
2. Kunwoo Lee, Principles of CAD/CAM/CAE System, Addison-Wesley Longman, latest edition.
3. Vince Adams and Abraham Askenazi, Building Better Products with Finite Element Analysis, Onword Press, latest edition.
4. J.Y.H. Fuh, Y.F. Zhang, A.Y.C. Nee, M.W. Fu, Computer-aided injection mold design and manufacture, Marcel Dekker, Inc, latest edition.

Subject Description Form

Subject Code	ME42006
Subject Title	Product Modeling and Prototyping
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME42005 CAD/CAE Technologies for Product Development
Objectives	To teach students the virtual prototyping, product data management (PDM), reverse engineering (RE) and rapid prototyping (RP) technologies and their applications in product development.
Intended Learning Outcomes	Upon completion of the subject, students will be: a. Provided with the principle and knowledge of product structure modeling and its application in product design and development. b. Able to employ the computer-aided design (CAD) and computer-aided engineering (CAE) related technologies for virtual prototyping of design concepts. c. Equipped with the basic concepts and knowledge of PDM and familiar with at least one commercial PDM software system. d. Able to use the techniques of reverse engineering and apply them in new product development, including product creation, revision and how to use it in rapid modeling. e. Able to use the rapid prototyping techniques for development of product prototypes for function, fit and form testing in product design and development.
Subject Synopsis/ Indicative Syllabus	*Product Structure Modeling* - Product structure concepts. - The modeling process. - Process date model - Plastic Processing. - case studies *Product Data Management* - Background and basic concepts - PDM systems - Applications and case studies *Virtual Prototyping* - Background ground, business drivers and basic concepts. - Enabling technologies - Applications and case studies.

<table>
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Reverse Engineering
- Background ground, business drivers and basic concepts.
- Enabling technologies
- Applications (Application filed and prospect of RE, steps in RE, technologies applied in RE, 3D scanning and digitizing).

Rapid Prototyping Technology
- Rapid Prototyping Processes and Interfacing.
- Rapid Tooling.
- Safety and Environmental Control in RP.

Laboratory Experiment:
Using RP technology to make real parts

Tutorials:
Using related software systems to illustrate the applications of the related technologies.
</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>

Lectures are used to deliver the fundamental knowledge related to advanced manufacturing processes and rapid prototyping technology. (Outcomes a to c)

Tutorials and case studies are used to illustrate the application of fundamental knowledge to practical situations. (Outcomes a to d)

Experiments are used to relate the concepts to practical applications and students are exposed to hand-on experience, proper use of equipment and application of analytical skills on interpreting experimental results. (Outcomes d and e)

Mini-project/study report is used to enhance the understanding and use of the learned knowledge. (Outcomes a to e)

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="5">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>Lecture</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Tutorials and case study</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Experiment</td><td></td><td></td><td></td><td>√</td><td>√</td></tr>
<tr><td>Mini-project / study report</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
</table>

</td></tr>
</table>

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
1. Test	20%	√	√	√	√	√
2. Homework/assignment	20%	√	√	√	√	√
3. Laboratory report	10%				√	√
4. Examination	50%	√	√	√	√	√
Total	100%					

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, assignments and laboratory reports which provide timely feedbacks to both lecturers and students on various topics of the syllabus.

Student Study Effort Required

Class contact:	
▪ Lecture and seminar	30 Hrs.
▪ Tutorial	7 Hrs.
▪ Laboratory work and workshop	2 Hrs.
Other student study effort:	
▪ Performing mini-project/study report	20 Hrs.
▪ Course work	23 Hrs.
▪ Literature search and private study	22 Hrs.
Total student study effort	104 Hrs.

Reading List and References

1. R. Budde, Prototyping: An Approach to Evolutionary System Development, Springer-Verlag, Berlin, New York, latest edition.
2. Rapid Prototyping, CK Chua, KF Leung, SC Lim, World Scientific, latest edition.
3. B. Benhabib, Manufacturing: Design, Production, Automation and Integration, Marcel Dekker, latest edition.
4. P.N. Rao, CAD/CAM Principles and Applications, McGraw Hill, latest edition.
5. S. Kalpakjian, S. Schmid, Manufacturing engineering and technology, Prentice Hall, latest edition.

Subject Description Form

Subject Code	ME42007
Subject Title	Design for Product Safety and Reliability
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME22002 Integrated Product Development Fundamentals
Objectives	To provide students an overview of the product liability and legal aspects in launching of new consumer products and develop their understanding of the management strategy in achieving product safety.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify problems related to liability, safety and reliability for an existing product design and apply their knowledge in reliability engineering to devise a technically and economically feasible solution. b. Apply knowledge of mathematics and engineering sciences via analytical and computational approaches to assess the risks of a product design and development project, and to assess the impacts of various key elements in achieving product safety. c. Develop systematically a safer and more reliable design for an existing product via a group project and present in a professional manner their ideas using multimedia and written reports.
Subject Synopsis/ Indicative Syllabus	*Product Reliability* – Definition of product reliability, reliability programme plan, reliability requirements, parameters, modeling, prediction, test requirement, and design for reliability. *Product Liability* - Meaning of product liability. Definition of defective product. Product liability in Hong Kong. Product liability law in Hong Kong. Product liability law in other Jurisdictions. *The Management of Design Risks* - Management strategy in product safety. Reducing product design risks through design reviewing systems. Personal and environmental risk identification of the whole product life from manufacturing to end of services disposal. *Product Safety Standards* - The consumer Product Safety Acts. The safety standards used in different countries such as Underwriters Laboratories Inc. (UL) in USA, British Standards in United Kingdom and International Electro-technical Commission (IEC) in Europe. Overview of the application and testing procedures in obtaining product safety markings for new products. Planning, implementation and control in product test and assurance.

Product Risk Identification Methods - Fault Tree Analysis (FTA). Failure Mode and Effect Analysis(FMEA). Hazard and Operability Study (HAZOP) and Hazard Analysis Critical Control Point (HACCP). The use of quantitative and statistical methods in assessing product risks and design optimisation.

Product Risk Management - Product Risk transfer through insurance and contract conditions.

Teaching/Learning Methodology

1. Lectures give coverage and exposure and arouse interest. (Outcomes a to c)
2. Group discussions and tutorials help students consolidate lecture materials. (Outcomes a to c)
3. Assignments, through which students learn to compile, assimilate, assess and analyze. (Outcomes a to c)
4. Through thematic projects students would keep abreast of current product liability law and strategies for management of design risks. The presentation of reports allows students develop communication skills. (Outcomes a to c)

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	√	√	√
Tutorial	√	√	√
Assignment	√	√	√
Project	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Group project	15%	√	√	√
2. Individual report	25%	√	√	√
3. Class presentation	10%	√		
4. Examination	50%	√	√	√
Total	100%			

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

Overall Assessment:

0.50 x End of Subject Examination + 0.50 x Continuous Assessment.

	1. For continuous assessment evaluation, each student is required to submit a minimum of three reports. One of these reports is group-based and the other two are individual assignments. Besides assessing all the written assignments, students will be required to present the group and/or individual projects in class. Class presentation and participation in discussions will be assessed. 2. To achieve the intended learning outcomes, it is considered that more emphasis on formative assessment would be appropriate as students' performance will be improved via written and verbal feedback. 3. Marked assignments provide feedback and reinforcement on learning key concepts and outcomes. 4. Through presentations/discussions, students will learn how to: i. Work effectively with diverse group of people; ii. Persuasively explain in both oral and written form their product safety concepts; iii. Tackle diverse and unstructured questions; iv. Tell thoughts, feelings, ideas so that others may understand; v. Supports and leads others in discussion. 5. The examination will be used to assess the knowledge acquired by the students to deal with product design risks in a strategic manner. It provides a reference of standards with which the learning outcomes are measured.	
Student Study Effort Required	Class contact:	
	▪ Lecture and seminar	33 Hrs.
	▪ Tutorial and group discussion	6 Hrs.
	Other student study effort:	
	▪ Performing group project	25 Hrs.
	▪ Conducting case study and assignment	23 Hrs.
	▪ Literature search and private study	18 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Abbot, Howard: Safer by design: a guide to the management and law of designing for product safety, Gower, latest edition. 2. Hammer, Willie: Product Safety management and engineering, American Society for Safety Engineers, latest edition. 3. The Law Reform Commission of Hong Kong: Report on Civil Liability for Unsafe Products, latest edition.	

Subject Description Form

Subject Code	ME46001
Subject Title	Numerical Predictive Product Analysis
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME31003 System Dynamics; and ME42005 CAD/CAE Technologies for Product Development
Objectives	To equip students with necessary knowledge in numerical and computer-aided predictive analysis tools so that they can effectively contribute in enhancing the quality and performance of products.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply knowledge of mathematics and engineering sciences via analytical and computational approaches to analyze and predict the performance of a product. b. Use related software tools to perform mathematical analysis effectively. c. Select and use appropriate computer-aided analysis techniques to predict performance of a product and optimize its functions, resource usage, environmental performance, etc. d. Formulate, execute and systematically manage a product analysis project using limited resources and communicate the project outcomes effectively.
Subject Synopsis/ Indicative Syllabus	*Introduction to Numerical Methods for Product Analysis* – Mathematical modeling of engineering problems. Major sources of errors involved in numerical methods. Use of software tools for numerical analysis: MATLAB fundamentals, programming with MATLAB. *Optimization* - Introduction to optimization. Development of objective functions and associated constraints and variables. Constrained optimization: Linear and non-linear programming problems. Case studies using MATLAB. *Curve Fitting and Regression* – Introduction to curve fitting, interpolation and extrapolation. Linear regression and non-linear regression. Use of software tools (MATLAB and Excel) to solve related problems. *Computer-aided Predictive Analysis* - Motion simulation, drop test, fatigue analysis, frequency analysis, computational flow dynamics analysis, thermal analysis, environmental performance analysis, optimization studies.

Teaching/Learning Methodology

1. Students will develop the intended learning outcomes mainly by undertaking a design analysis group project using CAE technologies and mathematical analysis software tools. Design analysis will be done for a new product developed by the students or for a selected existing product. The product should consist of several components made of different materials and some moving link mechanisms (example products: Lock pliers, garden scissors, stapler machine, bearing puller, children's toy, link mechanisms in machinery, linkage driven exercising units, etc.)
2. The lectures are aimed at providing students with necessary background knowledge in related mathematical principles, and computer-aided tools for product analysis. (Outcomes a to c)
3. The tutorials are aimed at enhancing the students' skills in effectively using computer-aided tools for product analysis and to provide them with guidance & timely feedback for mini-project activities. (Outcomes a to c)
4. The mini-project is aimed at providing them with an opportunity to apply the knowledge acquired from the course to solve real world product analysis problems. It is also expected that the students will enhance their team-working skills, written and oral communication skills by effectively participating in project learning and assessment activities. (Outcomes a to d)
5. The assignments are to get students engaged with learning activities continuously and to provide them with self-assessment opportunities on their progress of learning. (Outcomes a to c)

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture/Tutorial	√	√	√	
Mini-project report & presentation	√	√	√	√
Homework assignments/ In-class exercises	√	√	√	

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. Homework assignments/ In-class exercises	20%	√	√	√	
2. Test	30%	√			
3. Mini-project report & presentation	50%	√	√	√	√
Total	100%				

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

	Overall Assessment: 1.0 × Continuous Assessment. 1. Homework assignments & in-class exercises are aimed at evaluating the progress of students study and assisting them in fulfilling the respective subject learning outcomes. 2. Test will be used to assess the degree of achieving the subject learning outcomes by individual student. Their understanding of mathematical and design principles and ability to apply them to critically analyze related problems will be tested. 3. The mini-project is to assess students learning outcomes while providing them with opportunities to apply their learnt knowledge, enhance written & oral communication skills and team-working spirit.	
Student Study Effort Required	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials/Mini-project discussions & presentation	13 Hrs.
	Other student study effort:	
	▪ Self study/assignments	32 Hrs.
	▪ Mini-project report preparation and presentation	45 Hrs.
	Total student study effort	116 Hrs.
Reading List and References	1. S.C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw-Hill, latest edition 2. S.C. Chapra and R.R. Canale, Numerical Methods for Engineers, McGraw-Hill, latest edition 3. S.S. Rao, applied Numerical Methods for Engineers and Scientists, Prentice-Hall, latest edition 4. Robert L. Norton, Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, McGraw-Hill, latest edition	

Subject Description Form

Subject Code	ME49003
Subject Title	Capstone Project
Credit Value	6
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME31003 System Dynamics ISE386 Integrated Design for Manufacture ME33001 Mechanics of Materials ME34003 Thermofluid Mechanics
Objectives	To provide students an opportunity to utilize and integrate their knowledge of engineering, design and marketing in completing a real-life product design engineering project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate a design problem addressing certain market needs and to develop design specifications with due consideration of industrial design. b. Generate alternative design concepts, and then evaluate each of these concepts by considering the impacts of various important factors including human factors, materials used, manufacturing processes, quality and environmental issues, health and safety on product design and development. c. Apply arts, mathematics, information technology and engineering sciences via analytical, computational and experimental approaches to realize a selected design concept. d. Work effectively and make contributions independently in a multi-disciplinary design project team, and apply project management technique to ensure successful competition of the design project.) e. Understand the importance of life-long learning and perform literature search to upkeep with the state-of-the-art product design technology. f. Present a design project via oral presentation and written report.
Subject Synopsis/ Indicative Syllabus	*In-depth Study of Substantial Design Tasks* - Marketing survey; Alternative conceptual design; Engineering design and analysis; Product safety and reliability; Product testing techniques; Prototyping and development technologies. *Areas of Design Project* - Toys; Home appliances; Electronic and electrical appliances; Bio-medical equipment; Plastic and metallic products; Green products; Health products; Computer-aided technology for product development; Products for specialists. *Knowledge and Skills Required for Performing Design Project* - Problem identification; Literature review; Methodology for data analysis; Engineering design and analysis; Design concept generation; Safety and risk

<table>
<tr><td></td><td>analysis; Prototyping technology; Project management; Report writing and presentation skill.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
1. Guidance will be given to students during the whole design project. (Outcomes a to d)
2. Regular group discussions with the supervisor (and the industrial supervisor for an industrial-based project) to ensure the correct direction and focus of the project. (Outcomes a to e)
3. The interim report aims at ensuring the proper progress of the project.
4. The final report aims at examining the completeness, quality, workability, practicability and engineering content of the product being designed and developed.
5. Prototype and/or computer-aided simulation will be conducted to show the functionality and safety of the product being designed and developed. (Outcomes a to f)
6. Oral examination will be conducted to examine the presentation skill, ability to provide prompt response to a question and understanding of the whole design project.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="6">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Group Discussion</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Project</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
</table>
</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>1. Continuous monitoring</td><td>15%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2. Interim report</td><td>10%</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td>√</td></tr>
<tr><td>3. Final report</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Oral presentation</td><td>25%</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>

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

Overall Assessment:
1.0 x Continuous Assessment.
</td></tr>
</table>

1. Performance of each student should be assessed individually together with the team's overall performance by the supervisor, an independent assessor, the peers and an examination panel consisting of at least four academic staff (both FT and PT programmes usually use the same panel). The following criteria should normally be used for performance assessment:
    i. Innovative approaches in generating alternative design concepts to meet market need;
    ii. Functionality, workability, practicability and engineering content of the final design;
    iii. General attitude, initiative and effectiveness in making progress;
    iv. Engineering design and analysis, and work accomplishment;
    v. Quality of the interim and the final report;
    vi. Performance during the oral examination.
2. The continuous monitoring of a project group as a whole and that of each group member on an individual basis are conducted by the supervisor. The interim report is assessed by the independent assessor. The final report is assessed by both the supervisor and the independent assessor. As part of the assessment process, each group member is required to specify his/her own contribution in completing the project when compared to his/her team mates (peer assessment). In case of an industrial-based project, comments will be invited from the industrial supervisor but he/she will not be required to perform the formal assessment.
3. The supervisor monitors and assesses the overall and individual progresses through regular meetings. The interim report should be submitted to the independent assessor around week 8 of the first semester. The final report submitted before the end-of-year examination is assessed by both the supervisor and the independent assessor. Deal consideration of each student's individual contribution and performance will be taken into account.
4. During the oral examination, every group member is required to present the project especially on his/her significant contribution to the whole project, and respond to the questions addressed to him/her by the examination panel. Marks for oral examination are awarded to individual student by taking into account the group's overall performance.
5. The assessment system is summarized as shown in the following table:

Assessor	**Assessment Component (% of the total)**				
	Continuous Monitoring (15)	**Interim Report (10)**	**Final Report (25)**	**Final Report (25)**	**Oral Examination (25)**
Supervisor	√		√		
Independent Assessor		√		√	
Examination Panel					√

Student Study Effort Required	Class contact:	
	▪ Guided study	21 Hrs.
	Other student study effort:	
	▪ Conducting project	154 Hrs.
	▪ Literature search and private study	77 Hrs.
	Total student study effort	252 Hrs.
	Students will be guided to search relevant references by the supervisor.	
Reading List and References	To be advised by supervisor.	

Subject Description Form

Subject Code	SD3401
Subject Title	Designing for Humanities
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	There are three sections in the subject: Human Factors in Design, Designing for Disabilities, and the introduction of "Universal Design". 1. To introduce to students the fundamentals of human requirements that are essential to the success of user-related design. Well-designed visuals, products, systems and environments involve the appreciation and thorough consideration of the human aspects of design. Such aspects include the physiological, psychological and sociological factors. 2. Students will devise more appropriate solutions to design problems in the acknowledgement of the people they design for. 3. This subject intensifies at a later stage. It guides students to the appreciation of higher levels and more complex human requirements that relate to the success of user-interface design. 4. The subject addresses particularly the interface issues, which will contribute to future design studies (projects). The issue of designing for special group of users such as the disabled and the ageing populations will be investigated. The "Universal Design" principles will be discussed.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate a design problem addressing to certain market needs and by fully considering impacts of human factors, product safety and environmental issues. b. Fully consider the physiological, psychological, cultural and sociological factors in generating and evaluating alternative design concepts in product design. c. Present a design project via oral presentation and/or written report.
Subject Synopsis/ Indicative Syllabus	*Human Factors in Design* - 1. Understanding people's activities at work, rest & in play. The basic principles of human factors are introduced. The significance and relevance of the subject to design tasks are explained. 2. The appreciation and application of data in the physiological, psychological cultural and sociological aspects of people are presented. This section will start with anthropometry (body measurements).

	3. The evaluation of designs for people use: This includes people's abilities and limitations in relation to the tasks & environments, and thereby the designs. Methods of approaching human aspects for design projects are discussed. Students are expected to be able to identify user-interface issues, plan and carry out related tests and experiments needed to support design works, and to evaluate the design results. 4. The goal is to enhance *effectiveness, efficiency, comfort and safety* by improving the user/design interface. *User-related Design and Designing for Disabilities -* 1. User in normal conditions and environments. 2. User in extreme conditions and environments. 3. Designing for the elderly and the disability. 4. User testing methods: Heuristic evaluation (quick and inexpensive method made in early phases of design to evaluate the most significant usability problems); Pluralistic usability (evaluation performed by user interface specialists, designers and real users). 5. Usability test: A design evaluation in the usability that can be performed during the development of a product or system to reveal problems. This may result in re-design or modification, or for product/system comparison (compared against competitor's design). 6. Universal Design Principles.
Teaching/Learning Methodology	The teaching and learning approaches as stated in Section E are justified as below: 1. The teaching and learning methods include lectures, tutorials, case studies, seminars, and assignment (design exercise). 2. The lectures are aimed at providing students with an integrated knowledge required for understanding and analyzing Human Factors and related issues in Design. 3. The design exercise is aimed at allowing hands-on experience in team-work to appreciate the lectures. The students are required to participate in the mini-project through literature survey, information search, discussions, report writing and presentation of results. Innovative thinking is encouraged. 4. The tutorials are aimed at helping students to go through the exercise smoothly, and to guide the students to solve real-world problems using the knowledge they acquired in the class. 5. Case studies are there to reinforce the lectures and to encourage discussions.

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	
Design exercise assignment, presentation	90	✓	✓				
Motivation (participation in team, attendance)	10			✓			
Total	100 %						

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

The assessment methods are justified as below:

1. The Design Exercise assessment is in an "open-book" format to encourage continuous effort throughout the whole period of assignment.
2. The presentation allows student to learn about and experiencing in presenting one's view, opinion and argument in open critique, by thorough preparation.
3. The grade for motivation encourages students to work postively, energetically, in private and in group. It can be checked also by class-attendance.

Minimum condition to consider a grade, would require the student to satisfactorily complete and submit the assignment, and present it as indicated. A pass grade or above will depend on how well the student has achieved in the learning outcomes. In addition, the following points should be taken into consideration:

1. A minimum grade "D" should be obtained in assignment.
2. Assignment may require both "group effort" and "individual effort".
3. Copy right must be strictly respected. If a copy is detected, a zero score will be assigned regardless of whom/which group did the assignment.
4. Attendance of class is very important. If a student anticipates being absent from class for any reason, please notify the course instructor ahead of time. In the event of absence, it is the student's responsibility to catch up on any work missed.

Student Study Effort Expected	Class contact:	
	▪ Lecture	6 Hrs.

	▪ Tutorial, Seminar	16 Hrs.
	▪ Case Studies and Design Exercise	17 Hrs.
	Other student study effort:	
	▪ Research, preparation of design exercise and presentation	41 Hrs.
	Total student study effort	80 Hrs.

Reading List and References

1. Barbacetto, G. *Design interface: How man and machine communicate.* Arcadia Edizioni, 1992.
2. Chan, L. H.. *Successful aging: from the perspective of Hong Kong elderly: a qualitative approach.* Hong Kong: School of Nursing, The Hong Kong Polytechnic University. 2003.
3. Cox, K., Walker, D. User interface design. New York: Prentice Hall, 1993.
4. Dul, J. et al. *Ergonomics for beginners - A quick reference guide*. London: Taylor & Francis,.1993
5. Fernandes, T. Global Interface Design: A guide to Designing International User Interfaces. Boston: AP Professional, 1995.
6. Gary, D. et al. *Designing and using assistive technology: The human perspective.* London: Paul H. Brookes, 1998.
7. Grandjean, E. Fitting the task to the man. London: Taylor & Francis, 1998.
8. Kroemer, K. Ergonomics: How to design for ease and efficiency. Englewood Cliffs, N.J.: Prentice Hall, 1994.
9. Kroemer, K. Fitting the task to the human: A textbook of occupational ergonomics. London: Taylor & Francis, 1997.
10. Law, Kenneth Wing-kin (ed.). *Aging, gender and family in Singapore, Hong Kong and China.* Taipei: Programme for Southeast Asian Area Studies Academia Sinica. 2001.
11. Monk, A. *Improving your human computer interface*. New York: Prentice Hall, 1993.
12. Norman, D. A. *The invisible computer*. Cambridge MA: MIT Press, 1998.
13. Norman, D. *The design of everyday things*. New York: Doubleday,1990.
14. Philips, D. R; Yeh, A. (ed.). *Environment and ageing: environmental policy, planning and design for elderly people in Hong Kong*. Hong Kong: Centre of Urban Planning and Environmental Management, University of Hong Kong. 1999.
15. Prikl, J. *Guidelines and strategies for designing transgenerational products: a resource manual for industrial design professionals*. Syracuse, NJ: Syracuse University. 1998.
16. Sanders, M. *Human factors in engineering and design*. New York : McGraw-Hill, 1993.
17. Siu, K. W. M. (ed.). *New era of product design: Theory and practice.* Beijing: Beijing Institute of Technology Press, 2009.
18. Tilley, A. *The Measure of man and woman: Human factors in design*. New York: Whitney Library, 1993.
19. *Trans-generational design: Products for an aging population*. New York: Van

	Nostrand Reinhold, 1994. **Websites:** http://www.baddesigns.com/ *(Examples of bad Human Factors in design)* http://gemma.apple.com/ngs/lpp/adrpub/docs/dev/techsupport/insidemac/HIGuidelines/HIGuidelines-251.html *(Human Factors Society)* http://www.usernomics.com/hf.html *(Human factors & ergonomics)* http://www.iat.unc.edu/guides/irg-05.html *(User interface design: Bibliography)*

Subject Description Form

Subject Code	ENG4001
Subject Title	Project Management
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with knowledge in: 1. engineering project management tools in business organizations, taking into account the time-cost relationships, resources, processes, risks, the project life cycle, organization, and management principles; 2. project management methodologies and their application; 3. choosing project variables for effective project management; and 4. various developments of project management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. develop suitable project methodologies and techniques in various phases of the project life cycle; b. select appropriate project variables and practices that are applicable to engineering projects; c. propose project management solutions, taking into consideration the project objectives and constraints; and d. measure and report project progress.
Subject Synopsis/ Indicative Syllabus	1. <u>Project Overview, Management Principles, and the Systems Approach</u> Characteristics of projects and project management. Management principles. Project organisation. Team development. Systems concepts and principles. Conflict management. 2. <u>Project Methodologies, Project Templates, and Planning Techniques</u> Constraints: time, cost, and technical performance. Work breakdown structure. Management of scope. Scheduling tools: Gantt charts, network analysis techniques, time-phased networks, CPA, PERT, and resource smoothing. 3. <u>Pricing, Estimation, and Cost Control for Projects</u> Pricing process. Types of estimates. Budgeting project costs. Experience curve. Cost schedules and forecasts. Cost control systems. 4. <u>Assessment and Control of Projects</u> Earned value measurement system. Managing project risks. Computer-aided project management. Status reporting. Project closeout and termination. Project management maturity.

<table>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorial exercises, case studies, and laboratory work are used to deliver the various topics in this subject. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students' "learning to learn" ability. Some case studies are from best practices of projects, based on a literature review. They are used to integrate the topics and demonstrate to students how the various techniques are interrelated and applied in real-life situations.</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</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Continuous assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Written examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous assessment: short tests, written reports, and tutorial exercises are used to assess students' understanding and application of the knowledge that they have learnt relative to learning outcomes (a), (b), (c), and (d).

Written examination: questions are designed to assess learning outcomes (a), (b), (c), and (d). Students are required to answer five questions, each of which covers at least one of the learning outcomes.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td colspan="2">Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>2 hours/week for 12 weeks</td><td>24 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>1 hour/week for 9 weeks</td><td>9 Hrs.</td></tr>
<tr><td>▪ Case studies</td><td>3 hours/week for 1 week</td><td>3 Hrs.</td></tr>
<tr><td>▪ Laboratory work</td><td>3 hours/week for 1 week</td><td>3 Hrs.</td></tr>
<tr><td colspan="2">Other student study effort:</td><td></td></tr>
<tr><td colspan="2">▪ Preparation for assignments, short tests, and the written examination</td><td>79 Hrs.</td></tr>
<tr><td colspan="2">Total student study effort</td><td>118 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

1. Kerzner, H 2009, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling*, John Wiley, New York
2. Meredith JR and Mantel SJ 2009, *Project Management: a Managerial Approach*, Wiley, Hoboken NJ
3. Smith, NJ (ed.) 2008, *Engineering Project Management*, Blackwell, Oxford

</td></tr>
</table>

Subject Description Form

Subject Code	ME42001
Subject Title	Artificial Intelligence in Products
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME31002 Linear Systems and Control; or ME41004 Mechatronics and Control
Objectives	To provide students with basic knowledge on expert and fuzzy inference systems for product design and development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply knowledge of mathematics, expert systems and fuzzy inference systems to analyze a product design via analytical and computational approaches. b. Understand the applications of AI in high-tech product design and development. c. Work effectively as a member to tackle a multi-disciplinary design project involving the application of AI. d. Appreciate the state-of-the-art applications of AI in product design and present a design project via written report.
Subject Synopsis/ Indicative Syllabus	*Expert Systems for Products* - Principles of expert systems; Knowledge representations; Knowledge acquisition; Inference mechanisms; Learning and heuristics; Application of expert systems to product design and product data management; Understanding expert system shells, such as Prolog or Lisp; Building expert systems using Prolog or available software packages. [Case study 1: Apply expert system in product design] *Fuzzy Inference Systems in Product Design and Development* - Fuzzy sets and crisp sets; Membership functions; Properties of fuzzy sets; Operations on fuzzy sets; Operations on fuzzy relations; Fuzzy if-then statements; Inference rules; Developing fuzzy inference systems using Matlab or available software packages. [Case study 2: Apply fuzzy inference Systems in product design]

Teaching/Learning Methodology

1. The lectures are aimed at providing fundamental knowledge on product expert system and fuzzy inference systems for product design and development. (Outcomes a and b)
2. The tutorials are aimed at enhancing applicable skills of the students. Examples on the expert systems and fuzzy inference systems in commercial products will be involved. (Outcomes a and b)
3. The project is aimed at integrating the knowledge that will be applied through a team project on product design and development with expert systems and fuzzy inference systems. (Outcomes a - d)

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√		
Tutorial	√	√		
Project	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Class Test	25%	√	√		
2. Homework	10%	√	√		
3. Group Project	15%	√	√	√	√
4. Examination	50%	√	√		
Total	100%				

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

Overall Assessment:

0.50 x End of Subject Examination + 0.50 x Continuous Assessment.

The weighting of 50% on continuous assessment is meant to allow students to consolidate their learning through continuous effort such as assignments and project work. The group project will be assigned to students at early stage of the subject study which enables students to link the knowledge they learnt with the project step by step. Report and the presentation will be major outcomes of the project work that will show how the students are able to design expert systems and fuzzy inference systems for products. The examination is used to assess the knowledge acquired by the students for understanding expert systems and fuzzy inference systems of the products.

Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Laboratory / project / tutorial	6 Hrs.
	Other student study effort:	
	▪ Reading and review	20 Hrs.
	▪ Homework assignment	28 Hrs.
	▪ Project / Laboratory report	18 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Luger, G.F., and Stubblefield, W.A., Artificial Intelligence and the Design of Expert Systems, The Benjamin/Cummings Publishing Co., latest edition. 2. Clocksin, W. F., Programming in Prolog, Berlin; New York: Springer-Verlag, latest edition. 3. Boca Raton, FL, A first course in fuzzy and neural control**,** Chapman & Hall/CRC Press, latest edition. 4. Ross, Timothy J., Fuzzy logic with engineering applications, Chichester; Hoboken, NJ: Wiley, latest edition.	

Subject Description Form

Subject Code	ME42002
Subject Title	Design for Packaging and No-Assembly
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME33001 Mechanics of Materials
Objectives	To equip students with basic knowledge on design and selection of appropriate packaging solutions for products and to introduce product mechanism design using the contemporary approach of design for no-assembly.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify problems related to packaging for an existing package design and apply their knowledge in package engineering to devise a technically and economically feasible solution. b. Design a new packaging for the protection of a product and evaluate its effectiveness critically using analytical and computational tools. c. Design an improved packaging for an existing product via a group project and present in a professional manner their ideas using multimedia and written reports.
Subject Synopsis/ Indicative Syllabus	*Elements of Packaging* - Positioning and challenges of packaging in product design and development; making of product packaging – ideas and technology; approach to package development; packaging liability; environmental implications of packaging. *Paper, Board and Structural Design* - Types of paper and board; properties of paper and paperboard; selection and design for product packaging – folding cartons, setup boxes, corrugated fiberboard packaging. *Non-Paper Packaging* - Packaging design with plastics; shaping and molding techniques for plastics; flexible packaging; glassware; metal containers. *Cushioning* - Vibration and impact analysis for product packaging; fatigue problems; cushioning design with software tools; temperature and humidity considerations; uses of blocking, loose fill, bubble sheet and foam in place. *Design for No-Assembly* - Review of working principles of mechanisms; conventional and compliant mechanism designs; advantages and challenges of compliant mechanisms; compliant mechanisms and nature; utilization of flexibility and deflection of beams; application examples.

Teaching/Learning Methodology

1. The lectures are aimed at providing students with an integrated knowledge required for understanding of the storage requirements and structural design for product packaging and design for no-assembly. They provide a necessary framework for such subsequent self-learning and group-learning activities. (Outcomes a and b)

2. The mini-project is aimed at enhancing the written and oral communication skills and teamwork spirit of the students. The students are expected to utilize the knowledge acquired in class to create portfolio for packaging of selected products. The students are required to participate in the mini-project through literature survey, information search, system design and evaluation, discussions, report writing and presentation of results. Innovative thinking is encouraged. (Outcomes a to c)

3. The tutorials are aimed at enhancing the students' skills necessary for analyzing the quality and feasibility of packaging ideas and/or compliant design. Examples may include the evaluation of loading limits of a prescribed packaging structure, the evaluation of flexibility of a compliant mechanism, etc. Therefore, the students will be able to solve real-world problems using the knowledge they acquired in the class. (Outcomes a to c)

4. The assignments are aimed at providing students with an opportunity to use the acquired knowledge to analyze, assess and solve real-world packaging design problems. (Outcomes b and c)

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	√	√	
Mini-project	√	√	√
Tutorial	√	√	√
Assignments		√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Test	15%	√	√	
2. Assignment	15%	√	√	√
3. Mini-project	20%	√	√	√
4. Examination	50%	√	√	√
Total	100%			

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

<table>
<tr><td></td><td colspan="2">Overall Assessment:
0.50 × End of Subject Examination + 0.50 × Continuous Assessment.

1. The continuous assessment will comprise of three components: one closed-book test (15%), assignments (15%), and a mini-project (20%). The closed-book test is aimed at assessing the interim knowledge gained by the student. The assignments are aimed at providing students with an opportunity to use the acquired knowledge to analyze, assess and solve real-world packaging design problems and provide timely feedback on the progress of their learning. The mini-project is aimed at assessing the student's self-learning and problem-solving capability and communication skills.

2. The examination will be used to assess the knowledge acquired by the individual student in understanding and analysing related problems and to determine the degree of achieving the subject learning outcomes.</td></tr>
<tr><td rowspan="8">Student Study Effort Required</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>33 Hrs.</td></tr>
<tr><td>▪ Tutorial / mini-project consultations and presentations</td><td>6 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Conducting mini-project</td><td>27 Hrs.</td></tr>
<tr><td>▪ Working on assignments</td><td>18 Hrs.</td></tr>
<tr><td>▪ Literature search and private study</td><td>20 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>104 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">1. Hanlon, J. F., Handbook of Packaging Engineering, McGraw Hill, latest edition.
2. Jönson, G., Corrugated Board Packaging, Pira International, latest edition.
3. DeMaria, K., The Packaging Development Process: A Guide for Engineers and Project Managers, Technomic Publishing Company, latest edition.
4. Soroka, W., Fundamentals of Packaging Technology, Institute of Packaging Professionals, latest edition.
5. Jenkins, C. H., Compliant Structure in Nature and Engineering, WIT, latest edition.
6. Lobontiu, N., Compliant Mechanisms: Design of Flexure Hinges, CRC Press, latest edition.</td></tr>
</table>

Subject Description Form

Subject Code	ME42003
Subject Title	Design for Six Sigma
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111 Mathematics I
Objectives	To provide students an overview of product design using Design for Six Sigma (DFSS) technique and to introduce related tools and best practices.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify customer needs and formulate the relationship between customer desires and the manufacturing capabilities. b. Generate six sigma product design solutions to avoid manufacturing process problems before implementation. c. Carry out a design project and deliver outcome of the project via oral presentation and written report.
Subject Synopsis/ Indicative Syllabus	*Introduction* - Major processes used in design for Six Sigma in product design. Management of product development cycle-time. Product design using Design For Six Sigma (DFSS) technique. *Critical Parameter Management in Design* - Introduction to Critical Parameter Management. The architecture of the Critical Parameter Management Process. The process of Critical Parameter Management in product design. The tools and best practices of Critical Parameter Management (CPM). Metrics for project management within CPM. Data acquisition and database architectures in CPM. *Tools for Concept Development* - Gathering and processing the Voice of the Customer. Quality Function Deployment: The Houses of Quality. Concept generation and design for x methods. The Pugh concept. Evaluation and selection process. Modelling: ideal/transfer Functions, robustness additive models, and the Variance model. *Tools for Design* - Design Failure Modes and Effects Analysis. Reliability prediction. Descriptive statistics. Inferential statistics. Measurement systems analysis. Capability studies. Regression models. Design of experiments. *Tools for Optimization* - Taguchi methods for robust design. Response surface methods. Optimization methods. *Tools for Verifying Capability* - Analytical Tolerance Design. Empirical tolerance design. Reliability evaluation. Statistical process control.

Teaching/Learning Methodology

1. Lectures are aimed at providing students with basic understanding of related concepts, tools and techniques for Design for Six Sigma and arouse interest. (Outcomes a and b)
2. Group discussions and tutorials help students to consolidate their knowledge acquired from lecture materials. (Outcomes a and b)
3. Assignments, through which students learn to compile, assimilate, assess and analyze. (Outcomes a to c)
4. Through thematic projects students would keep abreast of latest development in product liability laws and learn how to apply DFSS in product design. The presentation of reports allows students develop communication skills. (Outcomes a to c)

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	√	√	
Tutorial	√	√	
Assignments	√	√	√
Mini-Project	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Project report/presentation	15%	√	√	√
2. Test	20%	√	√	√
3. Assignments	15%	√	√	√
4. Examination	50%	√	√	
Total	100%			

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

Overall Assessment:

0.50 x End of Subject Examination + 0.50 x Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts and knowledge in solving problems. It is supplemented by assignments, test, and a design project

	which provide timely feedbacks to both lecturers and students on key topics of the syllabus.	
Student Study Effort Required	Class contact:	
	▪ Lecture and seminar	33 Hrs.
	▪ Tutorial and group discussion	6 Hrs.
	Other student study effort:	
	▪ Conducting project	25 Hrs.
	▪ Conducting case study and assignment	25 Hrs.
	▪ Literature search and private study	25 Hrs.
	Total student study effort	114 Hrs.
Reading List and References	1. C.M. Creveling, J.L. Slutsky and D. Antis, Jr. Design for six sigma in technology and product development, latest edition. 2. Kai Yang and Basem El-Haik, Design for Six Sigma, McGraw Hill, latest edition.	

Subject Description Form

Subject Code	ME42004
Subject Title	Development of Green Products
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME22002 Integrated Product Development Fundamentals; or ME32001 Manufacturing Fundamentals; or CEE370 Environmental Science I
Objectives	To enhance students' awareness of environmental issues and provide them with necessary knowledge in green product development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Appreciate the environmental impact of product manufacturing, distribution, use and disposal. b. Critically evaluate the environmental impacts of products during their life cycle and suggest appropriate actions to minimize/mitigate the impacts. c. Apply green design concepts in designing/re-designing products to fulfill the needs of green product market. d. Evaluate existing products/processes/technologies in terms of their environmental performance, and present the findings via oral presentation and written report.
Subject Synopsis/ Indicative Syllabus	*Environmental Issues of Concern* - Depletion and degradation of natural resources, environmental pollution and history of responses to pollution, waste and waste disposal issues, global warming, ozone layer depletion, acid rains, desertification, climate change, consumerism and its effect on global environment , individual and social preference for green living. *Environmental Impact of Products* - Life-cycle of a product, environmental impact of products over its life-cycle, environmental impact of packaging, strategies for minimizing environmental impact, drivers for green product design *Green and Sustainable Product Development Process* - Concept of green and sustainable product development: product design, planning and innovation for environment, concept of eco-design, eco-labelling and energy-labelling, international environmental management standards. *Material Selection and Procurement for Green Product Development* – Material selection for green design: Material selection process steps for green design, material selection methods, and material assessments. Green Procurement: Benefits of green procurement, green procurement process steps, evaluation of suppliers, green procurement programmes.

	Environmental Assessment of Green Products - Criteria on the global warming, stratospheric ozone depletion, photochemical ozone formation, acidification, nutrient enrichment, ecotoxicity, human toxicity, resource consumption and working environment. Normalisation and weighting in the environmental assessment of products, life-cycle impact assessment (LCA) of products. *The Green Future* - Green consumerism, opportunities from green technologies, green taxes and their effect on product development and marketing.
Teaching/Learning Methodology	1. The lectures are aimed at providing students with an integrated knowledge required for understanding the need for a green design approach, developing green products, assessing environmental impact of products and highlighting the opportunities arising from green consumerism. They provide a necessary framework for subsequent self-learning and group-learning activities. (Outcomes a to c) 2. The tutorials are aimed at enhancing the students' skills necessary for analyzing the environmental impact of existing products and packaging solutions using various tools and develop solution strategies to minimize impact. Therefore, students will be able to solve real-world problems using the knowledge they acquired in the class. (Outcomes a to c) 3. The mini-project is aimed at enhancing the written and oral communication skills and teamwork spirit of the students. The students are expected to utilize the knowledge acquired in class to analyze the environmental impact of a selected existing product and systematically redesign it to enhance its green attributes in order to strategically place the product in rapidly developing green market. (Outcomes c and d) 4. The assignments and case studies are aimed at providing students with learning opportunities to study the practical implementations of green product and process assessments and developments. (Outcomes a, b and d)

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture/Tutorial	√	√	√	
Mini-project report & presentation			√	√
Homework assignments/Case 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. Homework assignments/ Case studies	10%	√	√		√
2. Test	20%	√	√	√	
3. Mini-project report & presentation	20%			√	√
4. Examination	50%	√	√	√	
Total	100%				

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment.

1. The continuous assessment will comprise three components: homework assignments & case studies (10%), test (20%) and mini-project report & presentation (20%). The homework assignments and test are aimed at evaluating the progress of students study and assisting them in fulfilling the respective subject learning outcomes. The mini-project and case studies are to assess students learning outcomes while providing them with opportunities to apply their learnt knowledge, enhance written & oral communication skills and team-work spirit.

2. The examination (50%) will be used to assess the knowledge acquired by students independently in understanding and analysing related problems critically and to determine the degree of achieving the subject learning outcomes.

Student Study Effort Required

Class contact:	
▪ Lecture	33 Hrs.
▪ Tutorial/Mini-project discussion & presentation	6 Hrs.
Other student study effort:	
▪ Self study/coursework	43 Hrs.
▪ Mini-project report preparation and presentation	24 Hrs.
Total student study effort	106 Hrs.

Reading List and References	1. Azapagic A., Perdan S., Clift R. and Surrey G., Sustainable Development in Practice, John Wiley & Sons, Ltd., latest edition. 2. Burall P., Product Development and the Environment, The Design Council, latest edition. 3. Fuad-Luke A., EcoDesign: The Sourcebook, Chronicle Books, latest edition. 4. Ottman J.A. Green Marketing, NTC Business Books, latest edition. 5. William McDonough & Michael Braungart, Cradle to Cradle: Remaking the Way We Make Things, latest edition. 6. Ulrich, K.T. and Eppinger, S.D., Product Design and Development, McGraw-Hill, latest edition.

Subject Description Form

Subject Code	ME43002
Subject Title	Nano- and Micro-technology Applications to Product Development
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME33001 Mechanics of Materials Exclusion: ME43004 Fundamentals of Nanoscience and Nanotechnology
Objectives	To introduce students up-to-date knowledge and technical principles of nano- and micro-technology for product applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply knowledge of mathematics, engineering sciences, micro-technology and nano-technology to analyze a product design via analytical and computational approaches. b. Understand the environmental, health and safety issues in applying micro-technology and nano-technology in high-tech product design and development. c. Appreciate the state-of-the-art applications of micro-technology and nano-technology to product design and present a design project via written report. d. Recognize the need to develop the ability of life-long learning.
Subject Synopsis/ Indicative Syllabus	*Introduction to Nano and Micro Science* - Concepts, principles, physical, mechanical and thermal properties at nano and microscales. *Characterization and Testing Techniques at Nano and Microscales* - Scanning probe microscopy, SEM, TEM, nano-indentation, nano-scratch and wear. *Applications of Nano and Microtechnology to Products* - Health and environmental products (e.g., nano marks); toys; textile products; home appliances (e.g., washing machines with nanotechnology); electronic products, sensors and actuators; computing products and information storage; nanofibracation and manufacturing. *Frontiers in Nano and Microtechnology* - Nanofluids, carbon nano-materials, nanocomposites, NEMS, MEMS, nanolithography, molecular self-assembly. *Ethic and Political Issues in Nano and Microtechnology* - Potential impact to human society.

Teaching/Learning Methodology

1. The lectures are aimed at providing students with an integrated knowledge required for understanding nano- and micro-technology related theories and methodologies. (Outcomes a and b).

2. The mini-project is aimed at enhancing the written and oral communication skills in English and team-work spirit of the students. The students are expected to develop and/or discover applications of nano- and micro-technology in the design of products and systems. The students are required to participate in the mini-project through literature survey, information search, discussions, field trips, report writing and presentation of results. Innovative thinking is encouraged. (Outcomes a, b, c and d).

3. The tutorials are aimed at enhancing the analytical skills of the students. Examples on applications of nano- and micro-technology will be discussed in-depth. So the students will learn to solve real-world problems using the knowledge they acquired in the class. (Outcomes a, b and d).

4. The experiments will provide the students with hands-on experience on the instrumentation of nano- and micro-technology and measurement at nano- and micro-scale. It also trains students in the analysis and presentation of experimental data. (Outcomes a and b).

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√		
Tutorial	√	√		√
Experiment	√	√		
Mini-project	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learing outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Assignment	10%	√	√	√	√
2. Test	20%	√	√	√	
3. Mini-project	20%	√	√	√	√
4. Examination	50%	√	√	√	
Total	100%				

<table>
<tr><td></td><td colspan="2">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:
0.50 × End of Subject Examination + 0.50 × Continuous Assessment.

1. The continuous assessment will comprise of three components: assignments (20%), laboratory reports (10%) and one mini-project (20%). The assignments are aimed at assisting the students in preparation for the tests and checking the progress of their study. The laboratory report is aimed at assessing the capability of the student in analyzing and reporting experimental data. The mini-project is aimed at assessing the student's self-learning and problem-solving capability and communication skill in English.

2. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems, critically and individually, related to nano- and micro-sciences and technologies.

Successful achievement of intended subject learning outcomes via the use of specific assessment method can be confirmed when:
1. Assignment: According to the assessment of measurement dimension, 80% of the students achieve the "Satisfactory" level or above.
2. Test: 80% of the students achieve an overall grade "C" or above.
3. Mini-project: According to the assessment of measurement dimension, 80% of the students achieve the "Satisfactory" level or above.
4. Examination: 80% of the students achieve an overall grade "C" or above.</td></tr>
<tr><td rowspan="7">Student Study Effort Required</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>30 Hrs.</td></tr>
<tr><td>▪ Laboratory / Tutorial</td><td>9 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading & Reviewing</td><td>23 Hrs.</td></tr>
<tr><td>▪ Assignment / Laboratory Report</td><td>43 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">1. W.A. Goddard, Handbook of nanoscience, engineering, and technology, Baca Raton, CRC Press, latest edition.
2. Poole and Owens, Introduction to Nanotechnology, John Wiley & Sons, latest edition.
3. T.R. Hsu, MEMS & microsystems design and manufacture, Boston, McGraw Hill, latest edition.
4. B. Bhushan, Springer handbook of nanotechnology, Berlin, Springer-Verlag, latest edition.
5. H. Fujita, Micromachines as tools for nanotechnology, Berlin, Springer, latest edition.</td></tr>
</table>

Subject Description Form

Subject Code	ME43003
Subject Title	Product Testing Technology
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME33001Mechanics of Materials
Objectives	To equip students with basic knowledge and universal standards of common product testing and examination technologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply knowledge of mathematics, engineering sciences and computing simulation to analyze and test a product design via analytical, experimental and computational approaches. b. Understand and explain the effects of various important factors including materials, manufacturing processes, environmental and health issues, reliability and safety issues on product design and development. c. Work effectively as a member and apply project management technique in the capacity of a team leader to complete a multi-disciplinary product testing project. d. Appreciate the state-of-the-art product testing technologies and present a design project via written report. e. Recognize the need to develop the ability of life-long learning.
Subject Synopsis/ Indicative Syllabus	*Purpose and Classification of Product Testing and Examination* - Damage and degradation of products, environmental attack, crack initiation, aging, fault in manufacturing process; classification of testing and examination methods. *Destructive Testing* - Tensile and shear strength tests; Drop tests for home appliances and toys; Impact and fracture toughness tests for plastics and metallic materials; Scratch and wear tests of surface coatings; Harness test; Creep and durability tests for static and dynamic products. *Non-destructive Testing (NDT)* - Damage detection in products; embedded sensor technology; Wireless sensing technique; Ultrasonic spectroscopy and detection technique; Vibration and acoustic emission technique; Acousto-ultrasonic reproducibility; C-scan of composite products; Thermal wave imaging and full-field NDE; Microwave evaluation; Eddy current and Magnetic flux techniques. *Product Examination Techniques* - Surface morphology examination using optical technique, scanning electron microscopy (SEM) and atomic force microscopy (AFM); Chemical analysis using EDX and XRF; Structure

examination using XRD.

Standards and Data Handling - Design for inspection; Testing codes and standards; Data collection and analysis techniques.

Virtual Testing - Product drop test simulations using CAE technique.

Teaching/Learning Methodology

1. The lectures are aimed at providing students with an integrated knowledge required for understanding and analyzing product testing technology and methodology. (Outcomes a and b).
2. The tutorials are aimed at enhancing the analytical skills of the students. Examples on the analysis of testing methods and testing results will be involved. So the students will be able to solve real-world problems using the knowledge they acquired in the class. (Outcomes a, b and e).
3. The experiments will provide the students with hands-on experience on the instrumentation and measurement. It also trains students in the analysis and presentation of experimental data. (Outcomes a and b).
4. The mini-project is aimed at enhancing the written and oral communication skills and team-work spirit of the students. The students are expected to apply the knowledge learnt in product testing technologies. The students are required to participate in the mini-project through literature survey, information search, discussions, report writing and presentation of results. Innovative thinking is encouraged. (Outcomes a, b, c, d and e).

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lecture	√	√			
Tutorial	√	√			√
Experiment	√	√			
Mini-project	√	√	√	√	√

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. Test	20%	√	√			
2. Assignment	10%	√	√			√
3. Project	20%	√	√	√	√	√
4. Examination	50%	√	√			
Total	100%					

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

	Overall Assessment: 0.50 x End of Subject Examination + 0.50 x Continuous Assessment. 1. The continuous assessment will comprise of four components: one test (20%), assignments (10%), project reports (10%) and oral presentation (10%). The test is aimed at assessing the interim knowledge gained by the student. The assignments are aimed at assisting the students in preparation for the tests and checking the progress of their study. The project report is aimed at assessing the capability of the student in analyzing and reporting experimental data, self-learning and problem-solving skills, and English writing capability. The oral presentation is aimed at assessing the student's communication and presentation skills. 2. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the product problems related to property testing and defect/motion detecting technologies.	
Student Study Effort Required	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Laboratory / Tutorial	9 Hrs.
	Other student study effort:	
	▪ Reviewing and Reading	26 Hrs.
	▪ Assignment / Laboratory Report	40 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Mechanical Testing, ASM International, ASM Handbook Volume 8, latest edition. 2. Sampling and analysis, Upper Saddle River, N.J.: Prentice Hall, latest edition. 3. Nondestructive testing of materials, Amsterdam; Washington, D.C.: IOS Press; Tokyo: Ohmsa, latest edition. 4. Practical non-destructive testing, Raj Baldev, New Delhi: Narosa Pub. House; Materials Park, Ohio: Distribution in North America only by ASM International, latest edition. 5. Encyclopedia of Materials Characterization, TA418.7.B73, latest edition.	

Subject Description Form

Subject Code	SD4041
Subject Title	Design in Business for Engineering
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ **Exclusion**	SD348 Introduction to Industrial Design ME49003 Capstone Project **OR** ISE445 PEM Capstone Project Nil
Objectives	Upon completion of the subject, students will be able to: To apply a model of strategies and processes to a Level 4 product development project undertaken concurrently to support the creation and development of a breakthrough product and services. The model includes the following: 1. Methods to obtain insights into emerging trends in consumer and industrial markets. 2. A means to navigate and control the 'fuzzy front end' of the product development process. 3. The use of qualitative research to understand who the customer is. 4. Techniques to assist in the integration of diverse team players. 5. A complete product development process from opportunity identification to patenting. 6. An approach that connects strategic planning and brand management to product development.
Intended Learning Outcomes	a. Formulate a design problem addressing certain market needs and to develop design specifications with due consideration of industrial design. b. Generate alternative design concepts, and then evaluate each of these concepts by considering the impacts of various important factors related to business. c. Apply arts, mathematics, information technology, material technology and manufacturing processes via analytical and computational approaches to realize a selected design concept. d. Understand the importance of life-long learning and perform literature search to upkeep with the state-of-the-art product design technology. e. Work effectively as a member or the leader in a multi-disciplinary design project team, and able to present a design project via oral presentation and written report.

Subject Synopsis/ Indicative Syllabus	The syllabus sets out the sequence for developing a breakthrough product/service and is delivered concurrently with the Capstone Project which has this objective. The process for new product development is as follows: *Stage 1 - Identifying the Opportunity* a) Interpret the interconnected factors of Social Change, Economic Trends, and Technological Innovation that lead to the Identification of Product Opportunity Gaps in the marketplace, for both products and services. b) Examine the concept of the Positioning Map, which shows how break-through products and services are differentiated from the competition by Style, Technology and Value. *Stage 2 - Understanding the Opportunity* Examine the complex combination of value attributes that connect breakthrough products/services to people's lifestyles. Turn insights into product concepts, list product characteristics and constraints. *Stage 3 - Conceptualizing the Opportunity* Turn value opportunities into useful, useable, and desirable product concepts. Identify the parts differentiation matrix. Produce visual prototype, functional prototype, clear market definition. *Stage 4 - Realizing the opportunity* Develop a clear marketing plan, taking account of the interests of stakeholders. Consider intellectual property protection. Consider materials and manufacturing process.
Teaching/Learning Methodology	This syllabus has evolved over three years of application as a core subject in the BA Hons Design. It is now a very successful component of this degree because the delivery of the syllabus is concurrent with an individual design project. This syllabus provides a powerful framework for new product development that is proposed by Professors Cagan and Vogel of Carnegie Mellon University. The framework described in their 2002 book *Creating Breakthrough Products: Innovation from Product Planning to Program Approval* (Prentice Hall) is the reference textbook for this syllabus. Professor Vogel is a visiting faculty in the School of Design which will enable us to maintain close links with the continuing refinement of this new product development framework. The pattern of lectures, seminars and tutorials shifts from a general approach of establishing an understanding of the framework for innovative product development which is established in the lectures, to a more specified application of the concepts which is progressed in seminars and

tutorials. This approach to the syllabus enables a close integration between this syllabus and the Capstone Project.

Major Teaching/Learning Activities:

Weeks 1 – 7	Lectures and seminars in which the conceptual framework is explained to students, and they begin to apply it to the early stages of the capstone project
Week 7	Hand in progress report
Week 8	Self study
Week 9	Review of progress reports
Weeks 10-12	Tutorials on the production of final reports
Week 12	Hand in final report
Week 13	Review of final reports

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	
1.Progress report	30	✓	✓	✓	✓		
2. Final report	60	✓	✓	✓	✓	✓	
3. Contribution to class activities	10					✓	
Total	100 %						

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

The participation in the co-requisite Capstone Project is based on groups of 3 students. It is desirable that all 3 students should elect to undertake this subject. In this case the presentations, Progress Report and Final Report are produced by the same group of 3 students.

In the event of only one or two members of a Capstone Project group electing to undertake this subject, their input to the Project is expected to be enhanced and enable them to take a leading role in the development of the Project.

The *Progress Report* (30% of assessment) should demonstrate how the concepts learned in this syllabus inform the Capstone Project. The concepts relating to the development of breakthrough products/services should strengthen the project proposal(s) of the Capstone Project by providing useful frameworks for developing new product ideas. The *Progress Report* should be about 2,000 words of explanation in addition to

<table>
<tr><td></td><td colspan="2">images, figures and other visual contributions. It is a draft of the Final Report that is to be handed in at the end of the semester.

The Final Report (60% of assessment) is to be handed in for grading in week 12. This report should provide a basis for the project report(s) of the Capstone Project. It will be a more developed version of the Progress Report. The structure of the report should reflect the choices made from the key concepts discussed in this syllabus, and should contain about 3,000 words of explanation in addition to images, figures and other visual contributions.

Contribution to class activities (10% assessment).

The assessed activities – the Progress and Final reports, are closely linked with progress in the Capstone Project. The Progress Report is both formative and summative. This approach supports deep engagement in the learning materials.</td></tr>
<tr><td rowspan="7">Student Study Effort Required</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Seminar and tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Research and self study</td><td>13 Hrs.</td></tr>
<tr><td>▪ Preparation of report</td><td>28 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>80 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">1. Cagan J. & C.M. Vogel, 2002, Creating Breakthrough Products: Innovation from Product Planning to Program Approval. Prentice Hall.
2. Bruce, M. & J. Bessant, (eds.) 2002, Design in Business: Strategic Innovation Through Design. Pearson Education.
3. Gilmore, F. & S. Dumont, 2003, Brand Warriors China: Creating Sustainable Capital. Profile Books.
4. Bruce, M & W.G. Biemans, 1995, Product Development: Meeting the Challenge of the Design-Marketing Interface. John Wiley.
5. Design Management Journal, Design Management Institute. Various editions.</td></tr>
</table>

Subject Description Form

Subject Code	SD4414
Subject Title	Design of Home and Personal Electronic Products
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	SD348 Introduction to Industrial Design Nil Nil
Objectives	We are surrounded by electronic products. They do not only affect some of our events or at particular occasions. Instead, they are almost completely related to our daily lives. The objective of this subject is for each student to have understanding and project experience in designing home and personal electronic products. The areas of the subject cover home audio and visual products, home appliances, personal electronic entertainment and leisure products, etc. Students are required to conduct an investigation on lifestyle, especially related to Asian lifestyle. Students will research and analyse successful brands in the personal electronics industry. By applying their research findings together with their knowledge and experience, students are required to design an electronic product.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate a design project of electronic products addressing certain market needs and to develop design specifications with due consideration of industrial design. b. Generate alternative design concepts, and then evaluate each of these concepts by considering the impacts of various important factors including functionality, performance, costs, time to market and reliability. c. Apply arts, mathematics, information technology, material technology and manufacturing processes via analytical and computational approaches to realize a selected design concept. d. Understand the importance of life-long learning and perform literature search to upkeep with the state-of-the-art electronic product design. e. Work effectively as a member or the leader in a multi-disciplinary design project team, and able to present a design project via oral presentation and written report.
Subject Synopsis/ Indicative Syllabus	Applied research on lifestyle (especially on Asian lifestyle). Different types of home and personal electronic products. Case study of electronic products (e.g., development of "Walkman";

<table>
<tr><td></td><td>"tamagoch", etc).

Design Factors: e.g., functionality, performance, user interface, form-factor, battery life, cost, time to market (TTM), reliability.

Physiological, social, cultural and ideological factors.

Application of technological and engineering knowledge and experience in design.

Successful brands in the personal electronics industry.

Product evaluation: user testing.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures, tutorials and design projects related to home and personal electronic (digital) products.
2. The lectures are aimed at providing design theories related to lifestyle (especially Asian lifestyle) and electronic products for the students.
3. Tutorials are used to support the students' design projects.
4. Students are required to tackle a design project. If necessary, they are required to realize their projects (may be in model and prototype forms) in computer labs and design workshops.</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>1. design and realization of design project</td><td>80</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. presentation</td><td>20</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>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

1. The assessment will comprise of 80% project (design and realisation) and 20% presentation.
2. Each student is required to get satisfactory performance in project and presentation.
3. Continuous assessment will be applied to access each student's performance of project.
4. There will be two critical presentation in the subject: Interim and final project presentations.</td></tr>
</table>

Student Study Effort Required	Class contact:	
	▪ Lecture and tutorial	20 Hrs.
	▪ Design project	19 Hrs.
	Other student study effort:	
	▪ Design project and preparation of presentation	41 Hrs.
	Total student study effort	80 Hrs.
Reading List and References	**Books:** 1. Haskell, B. (2004). P**ortable electronics product design and development:For cellular phones, PDAs, digital cameras, personal electronics, and more. New York, NY: McGraw Hill.** 2. Jordan, P. W. (1997). Putting the pleasure into products. IEE Review, Nov. 1997, 249-252. 3. Norman, D. A. (1998). The design of everyday things. London: The MIT Press. 4. Payne, B. (1997). Electronic products: Design, system, control. London: Collins Educational. 5. Roqueta, H. (2002). Product design. London: Te Neues. 6. Sanders, M. S. (1993). Human factors in engineering and design. New York, NY: McGraw-Hill. 7. Siu, K. W. M. (Ed.) (2009). New Era of Product Design: Theory and Practice. Beijing: Beijing Institute of Technology Press. 8. Stanton, N. (Ed.) (1998). Human factors in consumer products. London: Taylor & Francis. 9. Ulrich, K. T. (2004). Product design and development (3rd ed.). New York, NY: McGraw-Hill/Irwin. 10. Ward, A. E. (1996). Electronic product design. London: Chapman & Hall. 11. Whiteley, N. (1993). Design for society. London: Reaktion Books. **Journals:** 1. Design Issues. The MIT Press. 2. Design Studies. Elsevier Science. 3. The Design Journal. Bloomsbury.. 4. The Journal of Sustainable Product Design. Kluwer. 5. Human Factors. Extenza. 6. Journal of Engineering Design. Taylor & Francis.	

Subject Description Form

Subject Code	EIE2302
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 Hrs
	▪ Tutorial	4 Hrs
	▪ Laboratory	9 Hrs
	Other student study effort:	
	▪ Revision	36 Hrs
	▪ Tutorial and Assignments	21 Hrs
	▪ Log book and Report Writing	6 Hrs
	Total student study effort:	105 Hrs
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.	

Subject Description Form

Subject Code	ISE204
Subject Title	Instrumentation and Product Testing
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	HKDSE Physics, or Foundation Physics I and II (AP00002 & AP00003)
Objectives	This subject will enable students to 1. understand the fundamentals of instrumentation and the generic approach of product testing; 2. apply the basic techniques in instrumentation and select appropriate product testing standards for quality assurance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand the fundamentals of an instrumentation measurement system; b. evaluate the static and dynamic characteristics of instrumentation measurement systems; c. evaluate the test method and measuring instruments to ensure measurement accuracy; d. design an appropriate testing plan based on the features and standard requirements of a product.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> Roles of instrumentation and product testing in manufacturing engineering. Unit of measurement and universal standards. General factors affecting measurement accuracy. Planning for measurement. 2. <u>Fundamentals of an Instrumentation Measurement System</u> Instrumentation and measurement terminologies. Basic elements of an instrumentation measurement system. Schematic representation of an instrumentation measurement system. 3. <u>Characteristics of Instrumentation Measurement Systems</u> Static and dynamic characteristics of instrumentation measurement systems. Analogue-to-digital and digital-to-analogue conversions. 4. <u>Calibration of instruments and Error Analysis</u> Calibration process. Traceability. Standards and calibration laboratories. Types and causes of errors. Error reduction. Calculations of accuracy and errors.

<table>
<tr><td></td><td>5. <u>Product Testing</u>
Test categories and areas, various performance evaluation guidelines, methodologies. Testing standards and specifications. National and international standards. Generic approach for product testing.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, laboratory and tutorial exercises, and case studies will be used to deliver the various topics in this subject. Some of which will be covered in a problem-based format where this enhances the learning objectives. Others will be covered through directed study in order to enhance the students' "self learning" ability.

In particular, case studies based on published literature are used to integrate various product testing methodologies and thus help students to understand how various testing techniques are inter-related and how they are employed in real life 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="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Quizzes</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Laboratory exercises / Case study</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Mid-term test</td><td>25%</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Final examination</td><td>55%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>

Quizzes are used for assessing students' performance as well as monitoring their progress in attaining the intended learning outcomes. Additional tutorial classes will be given to those who need assistance. Students' experimental skills are assessed by the laboratory exercises. The written mid-term test and final examination are used to assess students' analytical skills related to the intended learning outcomes.</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>22 Hrs.</td></tr>
<tr><td>▪ Laboratory</td><td>8 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr>
<tr><td>▪ Case Study</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
</table>
</td></tr>
</table>

	▪ **Revision**	52 Hrs.
	▪ **Preparation for Laboratory Exercises, Assignment and Case study**	24 Hrs.
	Total student study effort	115 Hrs.
Reading List and References	1. Nakra, BC & Chaudhry KK 2004, *Instrumentation, Measurement and Analysis*, 2nd edition, Tata McGraw-Hill, New Delhi. 2. Beckwith, TG, Marangoni, RD & Lienhard, JH 1993, *Mechanical Measurements*, 5th edition, Addison-Wesley, New York. 3. *Consumer Product Evaluation Standards*, June 2010 <http://www.astm.org/Standards/consumer-product-evaluation-standards.html> 4. *BSI Healthcare and Testing Services*, June 2010 <http://www.bsigroup.com/en/ProductServices/>	

Subject Description Form

Subject Code	ISE306
Subject Title	Tool Design
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject enables the student to learn and apply the design of different tools, both technical and economical aspects, with reference to various production equipment and components, such as jigs and fixtures, press tools for sheet metal working, molds for plastic injection molding, and die casting.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. apply the basic principles in designing general jigs and fixtures, as well as molds and dies; b. assess the performance of a given tool design for meeting the specific design criteria; c. evaluate the effects of a given tool design on work quality.
Subject Synopsis/ Indicative Syllabus	1. <u>Fundamental Principles of Tool Design</u> Design criteria consideration; Application and justification of tool-type selection; Selection of tooling materials 2. <u>Design of Jigs and Fixtures</u> Principles of location and clamping; Design consideration of different types of jigs and fixtures; Applications and case studies 3. <u>Design of Presswork Tools</u> Blanking, piercing, bending, forming, and drawing tools; Compound, combination, and progressive tools; Justification of die selection 4. <u>Design of Plastic Molds</u> Basic construction of plastic injection molds; Functions and requirements of individual components; Decision for the number of cavities 5. <u>Design of Die Casting Molds</u> Design criteria and basic construction of different die casting molds, including the gating and runner systems; Applications and case studies

<table>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorial exercises, laboratory work, and case studies are used to deliver various topics on this subject matter. Students are divided into small groups and instructed to tackle several major tasks in real life via different CAD software packages. The tasks are covered in a problem-based format, as this can enhance the attainment of the learning objectives. Others are covered through guided studies in order to develop students' ability of "learning to learn."</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></td><td></td><td></td></tr>
<tr><td>1. Assignments</td><td>20%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Test</td><td>40%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Mini-group Project</td><td>40%</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 assessments are designed to help students reflect on and apply periodically the knowledge throughout the class period.

Student performance is continuously assessed by lab work, tutorials, assignments, progress tests, and mini-group projects, as well as presentations and written reports. Students are required to demonstrate their understanding and abilities in these assessment components, which are aligned with the intended learning outcomes.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>30 Hrs.</td></tr>
<tr><td>▪ Tutorial, Tests, Laboratory, and Mini-project</td><td>9 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments</td><td>20 Hrs.</td></tr>
<tr><td>▪ Preparation for Test, Presentation, and Report Writing</td><td>58 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>117 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>1. Spitler, D, Lantrip, J, Nee, J, and Smith DA, Fundamentals of Tool Design, latest edition, Society of Manufacturing Engineers, Dearborn.
2. Boyes, WE (Ed.), Handbook of Jig and Fixture Design, latest edition, Society of Manufacturing Engineers, Dearborn.</td></tr>
</table>

	3. Menning, G and Stoeckhert, K, *Mold-making Handbook: For the Plastics Engineer*, latest edition, Hanser Gardner Publications, Cincinnati. 4. *Injection Moulds*, latest edition, MS Welling (trans.), *VDI-Verlag*, Dusseldorf. 5. Menqes, G, Michaeli, W, and Mohren, P, *How to Make Injection Moulds*, latest edition, Hanser Gardner Publications, Cincinnati. 6. Street, A (Ed.), *The Diecasting Book*, latest edition, Portcullis Press, Redhill, Surrey.

Subject Description Form

Subject Code	ISE309
Subject Title	Mechatronics for Products
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. an introduction to product mechatronics and the knowledge of how to obtain environmental information and the methodologies of providing physical response to a situation by means of elementary sensory devices and actuators; 2. the techniques for enhancing the product intelligence by microcontrollers and/or programmable logic devices; 3. the knowledge on how to incorporate various theories that govern the characteristics of key functional components within the product during the product development stage, as well as the process of analyzing the alternative options available to a design.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand existing mechatronics products and identify essential components in making a mechatronics product; b. select appropriate sensory, actuation, and/or computing firmware techniques in product design; c. integrate various sensors/actuators to form a product with intelligence, which can be achieved by using of microcontrollers (computational devices) and some low-level programming skills; d. bring theories into practical applications through a detailed case study that incorporates mechanical, electronical, and sensory components. Students also need to apply the appropriate data capturing and analytical skills to relate the functions of various devices.
Subject Synopsis/ Indicative Syllabus	1. <u>Applications of Sensors in Products</u> Switches and contacts design; Application of optical, acoustic, temperature and pressure sensors/transducers, and their basic working principles 2. <u>Actuators and Mechanisms</u> Mini-motor characteristics, selections, and applications; Electro-mechanical actuators design and implementation 3. <u>Controllers</u> Product intelligence, basic machine code instructions, and Boolean

<table>
<tr><td></td><td>algebras; Micro-controller architecture, interface, and programming techniques
4. <u>Mechatronics Products</u>
Integration of sensors, controllers, actuators, and mechanisms to formulate a mechatronics product
5. <u>Case Study</u>
Development of an electronic bathroom scale, including beam theories, strain gauges, bridge circuit, and basic data capture techniques</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>This subject involves a combination of lectures, tutorials, laboratory classes, and case studies. These four components are carried out to provide the necessary fundamental knowledge to students. Case studies are employed to integrate the different components of the topic, as well as to demonstrate how various techniques/theories are related, and how they apply in real product design.</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. Laboratory</td><td>35%</td><td></td><td></td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Tutorial / Mini-project</td><td>25%</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Test</td><td>40%</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>
Intended outcomes (1) and (2) are assessed via tutorials and tests, a means of students to express their knowledge in written form. Outcomes (3) and (4) are demonstrated by both practical and written work.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td><td></td></tr>
<tr><td>▪ Lecture</td><td>2 hours/week for 8 weeks</td><td>16 Hrs.</td></tr>
<tr><td>▪ Tutorial/Case Study</td><td>1 hour/week for 8 weeks</td><td>8 Hrs.</td></tr>
<tr><td>▪ Laboratory</td><td>3 hours/week for 5 weeks</td><td>15 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td><td></td></tr>
<tr><td>▪ Assignment (laboratory, tutorial, mini project)</td><td></td><td>30 Hrs.</td></tr>
<tr><td>▪ Self-study/Preparation Work</td><td></td><td>50 Hrs.</td></tr>
</table>
</td></tr>
</table>

	Total student study effort	119 Hrs.
Reading List and References	1. David G. Alciatore, Michael B. Histand 2012, *Introduction to Mechatronics and Measurement Systems (4th Edn)*, New York: McGraw-Hill 2. A. Smaili, F. Mrad 2008, *Applied Mechatronics*, New York: Oxford University Press 3. Appuu Kuttan K.K 2007, *Introduction to Mechatronics*, New Delhi; New York : Oxford University Press 4. Godfrey C. Onwubolu 2005, *Mechatronics : Principles and Applications*, Oxford [England] ; Burlington, Mass. : Elsevier Butterworth-Heinemann	

Subject Description Form

Subject Code	ISE330
Subject Title	Product Safety and Reliability
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
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>
</table>
</td></tr>
</table>

	Total student study effort	110 Hrs.
Reading List and References	1. Abbot, H 1997, *Safety by Design: A Guide to the Management and Law of Designing for Product Safety*, Gower 2. Geistfeld, M A 2011, *Principles of Products Liability,* 2nd edn, Foundation Press 3. Owen, D G, Montgomery, J E , & Davis, M J 2010, *Products Liability & Safety: Cases and Materials*, 6th edn, University Casebook Series 4. 2003, *IEC 60300-1 Dependability Management-Part 1: Dependability Management Systems*, ed. 2.0 5. 2004, *IEC 60300-2 Dependability Management-Part 2: Guidelines for Dependability Management,* ed. 2.0 6. 2003, *IEC 60300-3-1 Dependability Management-Part 3-1: Application Guide – Analysis Techniques for Dependability – Guide on Methodology*, ed. 2.0	

Subject Description Form

Subject Code	ISE369
Subject Title	Quality Engineering
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	ISE206 Quantitative Methods or AMA1104 Introductory Probability or NSS Mathematics plus Module I or Equivalent
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> Vendor evaluation; Joint planning with suppliers; Best practices of partnership with suppliers

<table>
<tr><td></td><td>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 14 weeks</td><td>14 Hrs.</td></tr>
<tr><td>Other student study efforts</td><td></td></tr>
<tr><td>▪ Self Study/Assignment</td><td>58 Hrs.</td></tr>
<tr><td>▪ Case Study</td><td>13 Hrs.</td></tr>
</table>
</td></tr>
</table>

	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	ISE418
Subject Title	Computer-Aided Product Design
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. basic knowledge of various computer-aided engineering theories and technologies in product design; 2. skills to develop product design solutions using various computer-aided engineering tools.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. apply three-dimensional transformations and viewing operations in computer-aided product design; b. apply curve, surface, and solid modelling in computer-aided product design; c. apply finite element analysis (FEA) in product design; d. understand product data management (PDM) technologies and the acquisition of PDM systems; e. understand and appreciate virtual engineering technologies and how they can be applied to product life-cycle design.
Subject Synopsis/ Indicative Syllabus	1. <u>Three-Dimensional Transformations and Viewing Operations</u> Homogenous coordinates, rigid motions, scalings, shearings, projections. 2. <u>Geometric Modelling</u> Curve modelling, surface modelling, solid modelling. 3. <u>Finite Element Analysis (FEA)</u> Basic theory, processes, and techniques of FEA. 4. <u>Product Data Management (PDM)</u> Categories of functionality, utility function, and PDM system architectures. 5. <u>Virtual Engineering</u>

<table>
<tr><td></td><td>Virtual reality, virtual prototype, virtual processing, virtual assembly.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorials, and student-centred learning activities is used to achieve the above outcomes. Case studies and exercises are provided in the tutorials to reinforce the theories, methodologies, and tools introduced in the lectures. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students' "learning to learn" ability. Some case studies, largely those based on consultancy experience, are used to integrate these topics and demonstrate to students how the various techniques are interrelated and applied in real-life 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="6">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><td></td></tr>
<tr><td>1.Individual lab reports or tests</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Group lab reports</td><td>20%</td><td>✓</td><td></td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>3. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Individual lab reports or tests are used to assess students' understanding of three-dimensional transformation, viewing operations, and curve, surface, and solid modelling, and their ability to apply these in computer-aided product design. The coursework is designed to develop students' understanding of PDM and virtual engineering technologies, and their ability to apply these in product design.

Group lab reports are assigned to assess whether students truly understand three-dimensional transformations, viewing operations, and curve, surface modeling and can apply them in graphing. They are also used to assess whether students can apply FEA in product design.

A final examination is given to assess whether students truly understand three-dimensional transformations, viewing operations, and curve, surface, and solid modelling and how to use them. It also assesses students' understanding of FEA and knowledge of how to apply it in product design, and their understanding of PDM and virtual engineering technologies and how to apply these in product design.</td></tr>
<tr><td rowspan="3">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures 3 hours/week for 7 weeks</td><td>21 Hrs.</td></tr>
<tr><td>▪ Laboratory work/Case studies/Tutorials 3 hours/week for 6 weeks</td><td>18 Hrs.</td></tr>
</table>

	Other student study effort:	
	▪ Coursework	50 Hrs.
	▪ Preparation for tests and the final examination	30 Hrs.
	Total student study effort	119 Hrs.
Reading List and References	1. Bungartz, H.J., Griebel, M., Zenger, C. 2004, *Introduction to Computer Graphics*, Charles River Media 2. Zeid, I. 2005, *Mastering CAD/CAM/Ibrahim Zeid*., McGraw-Hill 3. Burdea, G. 2003, *Virtual Reality Technology*, Wiley-Interscience 4. Moaveni, S. 2008, *Finite Element Analysis: Theory and Application with ANSYS,* Pearson Prentice Hall	

Subject Description Form

Subject Code	ISE430
Subject Title	New Product Planning and Development
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Exclusion: MM484 Managing New Product Development
Objectives	This subject will enable students to 1. understand the new product development process and the strategic features of new product development; 2. develop strategic thinking, planning, and managing abilities throughout the entire new product development process; 3. understand various techniques in identifying new product opportunities.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. appreciate the generation of product concepts that satisfy the needs of customers; b. explore and analyze market needs and appreciate their direct relationship with new products; c. identify new product opportunities; d. introduce financial, environmental, social, and cultural considerations with regard to design decisions.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction to New Product Planning and Development</u> New product planning and development process, Types of new products, Drivers of new product development, Success and failure factors, New product development strategy and Analysis of business and completion environments for new product development 2. <u>Fundamental Issues of Strategic Planning of New Products</u> Modular product design, Product architecture, Product family design, Product line design, Product Portfolio planning, Customized products versus mass products, Technology roadmapping 3. <u>Customer Needs and Value</u> Acquisition, Organization and analysis of customer needs, Customer value and its measurement, Concept of customer lifetime value 4. <u>Segmentation, Targeting, and Positioning</u> Market and benefit segmentation and its techniques, Product

<table>
<tr><td></td><td>positioning, Perceptual mapping, Value mapping
5. <u>Opportunity Specification and Justification</u>
Needs analysis, Ethnography, Scenario analysis, Product innovation charter
6. <u>Defining Design Specification</u>
Conjoint analysis, QFD-based techniques
7. <u>Sales Forecasting and Financial Analysis</u>
Sales forecasting models, Choice modeling, Pricing techniques for new products, Examples of financial plans
8. <u>Concept Test</u>
Concept statements, Considerations, and Formats
9. <u>Managing New Product Development Projects</u>
Development team organization, Innovative organization, Risk analysis and management, New product development models</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Teaching and learning activities include lectures, tutorials, case studies, a group project, and a laboratory exercise. The lectures are aimed at providing students with the basic understanding of new product development process, as well as common techniques and methods used in new product planning. In tutorial classes, small group discussions are facilitated for students to enhance their understanding of the subject matter. Through a number of minor exercises in tutorial classes, students not only have better understanding of the subject matter, but teachers are also allowed to monitor their learning progress. All the case studies are related to real-life successful and failed cases of new product development. Through the case studies, students can appreciate various issues and factors leading to the success and failure of new product development. Laboratory exercises provide students with hands-on experience on the segmentation and generation of perceptual maps.</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. Group project with individual assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Assignments</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Test</td><td>30%</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 project is aimed at assessing the ILOs a, b, and c of students. The</td></tr>
</table>

	assignments of this subject contain in-class assignments and take-home assignments which are used to assess all the ILOs of students. A test is normally conducted by the end of the semester and is aimed at assessing all the ILOs of students.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	24 Hrs.
	▪ Tutorials and Case studies	11 Hrs.
	▪ Laboratory exercise	2 Hrs.
	▪ Test and student presentations	2 Hrs.
	Other student study effort:	
	▪ Project	45 Hrs.
	▪ Preparation for test	23 Hrs.
	▪ Take-home assignments	20 Hrs.
	Total student study effort	127 Hrs.
Reading List and References	1. Crawford, C.M., and Di Benedetto, C.A., *New Products Management*, McGraw Hill 2. Glen, L. 1993, *Design and Marketing of New Products*, Prentice Hall 3. Lilien, G.L. and Rangaswamy, A. 2003, *Marketing Engineering – Computer Assisted Marketing Analysis and Planning*, Prentice Hall 4. Baxter, M. 1995, *Product Design – Practical Methods for Systematic Development of New Products*, Chapman & Hall 5. Ulrich, K.T. and Eppinger, S.D., *Product Design and Development*, McGraw-Hill 6. *Design Management Journal*, Design Management Institute Press 7. *The Journal of Product Innovation Management*, Elsevier Science Inc.	

Subject Description Form

Subject Code	ISE445
Subject Title	Capstone Project
Credit Value	6
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject aims to 1. provide students with the opportunity to have an in-depth exploration of a particular topic in Product Engineering with Marketing (PEM); 2. develop the skills of students so that they may work effectively on their own while demonstrating initiative to perform tasks and within constraints; 3. develop the ability of students in preparing, presenting, and defending a project report.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. define a problem by understanding its background, then set the objectives and deliverables of a project that addresses a significant issue relevant to the goal pursued by the student; b. develop and implement the strategies and methodology to achieve the project objectives within a given set of constraints; c. communicate effectively with stakeholders of the project and work independently to achieve the project objectives and produce the deliverables; d. prepare, present, and defend a clear, coherent, and succinct project report.
Subject Synopsis/ Indicative Syllabus	Each student is required carry out an individual project in an area relevant to the discipline of PEM. Details of the work will depend on the subject of the project that the student works on.
Teaching/Learning Methodology	This subject is conducted using an integrated project-based learning approach. Students work on an individual project selected or proposed in the stream area of PEM. An academic supervisor is assigned to guide and monitor the progress of the project. There is a final project presentation and each student is required to submit a project report. Throughout the duration of the project, supervisors make themselves available for discussions with their students at meetings arranged at mutually convenient times. To aid students in organizing their project in a systemic manner, students are required to submit a progress report, which provides detailed records of the various stages of project work.

<table>
<tr><td></td><td>The proposed project defined by the student and/or the supervisor should be in an area relevant to the discipline. The project will be used as a vehicle for the student to integrate his/her knowledge gained in the programme. In order to achieve the subject learning outcomes, it is not appropriate to have projects mainly focused on literature review or pure computer programming. Depends on the nature of the project, the work covers by the students may include the background and scope of the project; literature review, field works; experiments; data collection; case studies; methodology; discussion; and conclusion.</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.Continuous assessment</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Progress report</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Oral presentation</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>4. Report</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>
Performance of the student's drive and diligence in carrying out his/her project work is assessed by the project supervisor. This provides a reflection of the student's creativity and self-motivation demonstrated throughout the project.
The progress report is assessed by the co-examiner, an individual who is generally not involved in supervising the student. The assessment of the progress report reflects the student's performance in pursuing the project work from a third person's point-of-view.
The oral presentation is assessed by both the supervisor and the co-examiner. The assessment is designed to test the student's ability in marshalling his/her thoughts clearly and in presenting finished output, which had been logically and succinctly executed on various aspects of the product analyses.
The individual written report is assessed by both the supervisor and the co-examiner. The students use the written report to demonstrate their performance. Written reports reflect the depth of the student's comprehension of the subject, as well as the ability of the student to logically present his/her analyses in a written format.
</td></tr>
</table>

Student Study Effort Expected	Class contact:	
	▪ Project briefing	2 Hrs.
	▪ One day per week is allotted for analyses and investigations of individual projects. Students are expected to work on this for at least	78 Hrs.
	Other student study effort	
	▪ Discussion with supervisors	16 Hrs.
	▪ Preparation for oral presentation	38 Hrs.
	▪ Preparation for report writing	80 Hrs.
	Total student study effort	214 Hrs.
Reading List and References	Different references are recommended by different project supervisors depending on the nature of the individual project concerned. Recommended texts related to the generic skills for carrying out a student project are as follows: 1. Peck, John and Coyle, Martin 2005, *The Student's Guide to Writing: Grammar, Punctuation and Spelling*, 2/e, Palgrave MacMillan 2. Cottrell, Stella 2011, *Critical Thinking Skills: Developing Effective Analysis and Argument*, 2/e, Palgrave MacMillan 3. http://www.unisa.edu.au/ltu/students/study/referencing/harvard.pdf	

Subject Description Form

Subject Code	ISE3007
Subject Title	Integrated Product Engineering Project I
Credit Value	3
Level	3
Pre-requisite/Co-requisite	Nil
Objectives	This subject facilitates students to develop their ability in applying various computer-aided technologies on product development with the aim to: 1. enable them to understand various computer-aided technologies and their application on design, analysis and manufacture of new products; 2. provide them with the platform to apply appropriate methodologies and software tools involved in product design; 3. provide them the opportunity to function in a multidisciplinary team.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. model product geometries; share and reuse product information in new product development; b. analyse and optimise a product within realistic constraints by applying appropriate methods; c. communicate (oral, written, graphical, and numerate) effectively.
Subject Synopsis/ Indicative Syllabus	Students are required to work through the various stages step-by-step from conceptual design to implementation and evaluation. The subject is expected to cover the following topics: <u>1. Digital Mockup Generation</u> Mechanical CAD modelling for machine elements; Freeform CAD modeling for consumer products: class A surface & 3D texture; Assembly & mechanism modelling; Reverse engineering; Virtual sculpting. <u>2. Virtual Verification</u> Rendering and animation; Engineering analysis: structurally, thermal, motion & mechanism, CFD; Direct digital manufacturing: rapid prototyping. <u>3. Concurrent Collaboration</u> PDM: configuration, version & change management, security, BOM & parts file management, inter-operatability; viewer sharing.

<table>
<tr><td>Teaching/Learning Methodology</td><td>This is an activity-orientated subject which adopts a project-based learning approach. Although no formal lectures are given, briefings/seminars and laboratory/tutorial sessions are available to provide students guidelines and assistance in conducting the project. Students are divided into groups of about five members and work on a product-based project. The teaching and learning activities in each stage of the project are used to facilitate students to achieve the intended learning outcomes by reflection, imitation, and experience. Feedback will be given to students for making improvement.</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="3">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Progress Assignments</td><td>70%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final Reports</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="3"></td></tr>
</table>
In each of the assessment components above, it consists of both “group work” and “individual work” to reflect the students’ performance. The progress of the project is assessed periodically to monitor the students’ achievement towards the intended learning outcomes (a), (b), and (c) via seven progress assignments. Final oral presentation and report allows students to demonstrate their abilities in presenting their projects clearly and logically including the project objectives, their approaches to solve the problem and the deliverable of their projects. It is appropriated for the assessment of all intended learning outcomes.
</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Briefings/seminars and tutorial/laboratory sessions</td><td>39 Hrs.</td></tr>
<tr><td>▪ Other student study effort:</td><td></td></tr>
<tr><td>▪ Preparation of reports and oral presentation</td><td>42 Hrs.</td></tr>
<tr><td>Guided Study/Self-learning</td><td>45 Hrs.</td></tr>
<tr><td>▪ Total student study effort</td><td>126 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

1. Akin, John Edward 2010, *Finite Element Analysis Concepts: via SolidWorks*, World Scientific
2. Burden, Rodger 2003, *PDM: Product Data Management*, Resource Pub
3. Chua, Chee Kai, Leong, K. F., & Lim, C. S. 2010, *Rapid Prototyping: Principles and Applications*, World Scientific 3/e

</td></tr>
</table>

	4. Lee, Kunwoo 1999, *Principles of CAD/CAM/CAE Systems*, Addison-Wesley 5. Otto, K. 2001, *Product Design: Techniques in Reverse Engineering and New Product Development***,** Prentice Hall 6. Vaughan, William 2012, *Digital Modeling*, New Riders 7. Training materials published by the Industrial Centre, The Hong Kong Polytechnic University

Subject Description Form

Subject Code	ISE4005
Subject Title	Eco-design and Manufacture
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject is aimed to 1. provide students with the recent global trends and significance eco-design and manufacture in industry; 2. ensure that students are aware of the regulatory requirements of European Union (EU), China, USA, Japan, and other regions on eco-design and manufacture; 3. provide students with a holistic approach to eco-design and manufacture, and to address issues such as: environmental impact; product eco-design, use, and life; technology capabilities; and business benefits.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. address issues relating to recent global trends and significance of eco-design and manufacture in industry; b. be aware of the regulatory requirements of European Union (EU) on eco-design and manufacture; c. take a holistic approach to eco-design and manufacture, addressing and relating elements like: environmental impacts; product eco-design, use and life; technology capabilities; and business benefits; d. understand and apply the methods to reduce environmental impacts throughout the whole product life cycle by better product eco-design and use.

Subject Synopsis/ Indicative Syllabus	1. Introduction to Eco-design and Manufacture Sustainable product development, global environmental concerns, impact on merchandise trade, eco-product market trends, business benefits and opportunities; driving forces of eco-design and manufacture, role of designers and engineers. 2. Environmental Considerations in Product eco-design Stages of product development process in eco-design; Materials, manufacturing and packaging, use, end-of-life and disposal issues; design for disassembly and recycling; Recycling Potential Indicator (RPI); the six RE-philosophy. 3. Global and regional regulatory requirements on Eco-design and Manufacture Eco-product Laws in Japan; Eco- product Legislations in the US; EU Directives: Waste of Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and EcoDesign framework for Energy Using Product (EuP) and Energy-related Product (ErP); China Environmental Laws. 4. Environmental Assessment of Products and related tools and techniques Life Cycle Assessment (LCA) and streamlined methods, e.g. MET, Philip's Fast-Five; Software tools in LCA, e.g. SimaPro and Gabi; Integrated Product Policy (IPP); "Green Mark", "Eco-labels" and eco- labeling schemes and programmes. 5. Environmental Management Systems International Standards (ISO14000), management of waste materials and chemical substances; Registration of Chemicals in European Union; Green supply chain management. 6. Industrial Examples in Eco-design and Manufacture Eco-design of electrical appliances, examples of green-manufactured electronic products; alternate and emerging green technologies.
Teaching/Learning Methodology	In the lectures, the general principles of the syllabus topics will be presented and developed. In the case studies, students will develop and apply these general principles through student centered learning activities under the guidance of the lecturer. In the seminars, they will be able to learn and appreciate the latest developments of the subject, particularly its practice in various industries in Hong Kong and the Pearl River Delta region. The pace of change in the subject area is faster than conventional subject revision procedures can effectively accommodate. Moreover some of the techniques, technologies, and practices are highly specialized and unique to different industries. As a consequence, the material taught during the early

<table>
<tr><td></td><td>years of the subject may become outdated by the time the student graduates. To accommodate these circumstances, this level-4 subject serves two separate functions. Firstly, it is to ensure that students are aware of the overall global trends in eco-design and manufacture, its regulatory requirements and business opportunities with compliance. Secondly, it is to prepare students for subsequent in-depth study in selected topics relating to techniques, methodologies and technologies in the subject. Where appropriate, seminars and/or visits will be arranged for students to get wider exposure.</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.Tutorial Exercises</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Take home assignment</td><td>10%</td><td></td><td></td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Test</td><td>20%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4. Examination</td><td>50%</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>
Tutorial exercises are designed to facilitate students to reflect and apply the knowledge on eco-design and manufacture to practical problems and real-life cases.

Take home assignment is designed to facilitate students to address problem by taking a holistic approach to eco-design and manufacture, and to reduce environmental impacts throughout the whole product life cycle by better product design and use.

Test is designed to be aware of the regulatory requirements of European Union (EU) on eco-design and manufacture, and to address issues relating to recent global trends and significance of environmental eco-design and manufacture in industry.

Written examination is designed to facilitate students to show their understanding of the topic through analyzing problem-base and case-base questions/scenario in order to present their concepts clearly and logically.
</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 11 weeks</td><td>22 Hrs.</td></tr>
<tr><td>▪ Guided Learning/Case Studies 2 hours/week for 7 weeks</td><td>14 Hrs.</td></tr>
<tr><td>▪ Seminars 1.5 hours/week for 2 weeks</td><td>3 Hrs.</td></tr>
</table>
</td></tr>
</table>

	Other student study effort:	
	▪ Preparation for reading guided learning background information and case studies	50 Hrs.
	▪ Preparation for seminars and take home assignment and application software	36 Hrs.
	Total student study effort	125 Hrs.
Reading List and References	1. Davis M.L. and Masten S.J., *Principles of Environmental Engineering and Science*, McGraw-Hill 2. Ulrich K.T. and Eppinger S.D., *Product Design and Development*, McGraw-Hill, latest edn 3. J. Rodrigo, *Electrical and Electronic: Practical Design Guide*, F. Castells University Rovira I Virgili, Tarragona, Spain, latest edn. 4. H. Lewis and J. Gertsakis, *Design + Environment: A Global Guide to Design Greener Goods*, Greenleaf Publishing Ltd., latest edn 5. European Union Directives on WEEE, RoHS and EuP, latest edn	

Subject Description Form

Subject Code	MM3761
Subject Title	Marketing Research
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** Introduction to Marketing (MM2711) or Marketing (MM273) And Introduction to Probability and Statistics (AMA217) or Quantitative and Computational Methods (ME3903) or Quantitative Methods for Business (AMA2101/LGT2101) or Quantitative Methods (ISE206) or Introductory Probability (AMA1104) or Probability & Engineering Statistics (AMA302/AMA305) or Statistics and Mathematics for Textiles (ITC241) or equivalent
Role and Purposes	It provides an understanding of the underlying concepts of marketing research and the importance of information to the making of marketing decisions. It aims to introduce students the basic marketing research techniques and to develop their ability to interpret marketing research findings. This subject contributes to 6 of the 13 outcomes of the BBA(Hons) Programme.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. explain the nature and scope of marketing research (**BBA Outcomes 9 & 10**); b. describe its role in designing and implementing successful marketing programs (**BBA Outcomes 9 & 10**); c. locate and identify information sources relevant to solving marketing problems (**BBA Outcomes 9 & 10**); d. use statistical programs for analyzing and interpreting marketing research data (**BBA Outcomes 6, 9 & 10**); e. use and evaluate marketing research, and to design simple research investigations (**BBA Outcomes 1, 9 & 10**).

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>- The Role of Marketing Research
- Common Research Questions Asked
- An Overview of Data Source
- Observations, Focus Groups and Depth Interviews
- Conducting Surveys
- Designing Questionnaire
- Sampling Procedures and sample Size
- Preparing Data for Analysis
- Univariate Data Analysis
- Bivariate Analysis</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>This subject is taught in fourteen three-hour session on a weekly basis. The sessions consist of formal lectures, seminar discussions, computer workshops and case study analysis. Active student participation is expected. Lectures cover the main theoretical, conceptual and technical aspects of the syllabus. Computer workshops are used for students to gain hands-on experience of application software in analyzing survey data. The other activities are for developing and integrating the materials in the subject.</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>Continuous Assessment</td><td>50%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1. Exercises/Presentations</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>2. SPSS Test</td><td>20%</td><td></td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Individual/group assignment</td><td>20%</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>Final Examination</td><td>50%</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>
*Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.

To pass this subject, students are required to obtain Grade D or above in <u>BOTH</u> the Continuous Assessment and Examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: the various methods are designed to ensure that all students taking this subject –
▪ Demonstrate the basic understanding of concepts/theories;
▪ Possess the ability to apply concepts/theories to real situations and prepare a simple research proposal
▪ Solve problems in business settings
▪ Apply concepts/theories in a given situation and solve problems</td></tr>
</table>

	▪ Use statistical programs for analyzing and interpreting marketing research data is assessed	
Student Study Effort Required	Class contact:	
	▪ Lectures	39 Hrs.
	Other student study effort:	
	▪ Preparation for lectures	14 Hrs.
	▪ Preparation for SPSS tests, in-class exercises, take-home and group assignments, and final examination	56 Hrs.
	Total student study effort	109 Hrs.
Reading List and References	*Recommended Textbook* Burns & Bush, ***Marketing Research – Online Research Applications,* 7/E** (Prentice Hall). *References* Aaker, Kumar and Day, *Marketing Research* **11/E** (Wiley). Churchill & Iacobucci, *Marketing Research: Methodological Foundations,* **10/E** (South-Western)	

Subject Description Form

Subject Code	MM4711
Subject Title	Business to Business Marketing
Credit Value	3
Level	4
Normal Duration	1-semester
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** Introduction to Marketing (MM2711) or equivalent
Role and Purposes	This advance subject aims to enhance students' abilities to analyze sales and marketing activities in a Business environment and achieves a number of BBA Programme Outcomes. It directly addresses the roles and the interactional dynamics of a buyer and a seller in the value-added manufacturing context (Outcome 11 & 12). It also perceives a seller from a problem solver's perspective and how this seller helps improve a buying organization that is internally guided by its product innovation, cost management, and marketing programs and externally influenced by its domestic and global economic environment (Outcome 9 & 13). The seminars, class activities and assignments develop students' abilities in English communication and creative thinking skills (Outcome 1 & 4).
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the nature and scope of business-to-business market and the differences between consumer marketing and business marketing (**BBA Outcomes 8 & 10**). b. Apply buying models and theories to analyze organizational buying behavior; conceptualize the business dynamics in the business market **(BBA Outcome 9)**. c. Formulate and evaluate higher level marketing strategies (targeting, segmentation, positioning and differentiation) and lower level strategies (product, pricing, channels of distribution and promotions) in different business marketing settings **(BBA Outcomes 1, 3 & 6)**. d. Propose and evaluate relationship strategies in a business-to-business interactional environment (**BBA Outcome 10**).
Subject Synopsis/ Indicative Syllabus	**Business Marketing Perspective** Marketing to different types of business organizations, appreciating the cost and profit context of business and economic environment; explaining the differences between business and consumer marketing. **Organizational Buying Behavior** Recognizing the strategic goals of purchasing, the procurement procedures, and buying situations in the business, government, and institutional organizations; acknowledging the relationships between

	strategic purchasing goals, cost drivers, cost reduction program and revenue enhancement. **Relationship Management** Appreciating the relationship spectrum; recognizing the relationship between collaboration and operational linkage; formulating relationship program; searching relationship dimensions; acknowledging the differences between western and Chinese relationship management. **Business Market Segmentation** Segmenting the business market; supporting segmentation through technology environment and product differentiation; the relationship between segmentation and sales planning. **Business Product Mixes** Creating product core competence through value chain; Classifying business product; Improving product positioning through quality management. **Business Pricing Mixes** Perceiving pricing from a cost perspective; deriving target cost management procedures; recognizing the relationship between price, cost and profit. **Business Placing Mixes** Classifying direct and indirect placing option; delineating the role of direct sales offices, distributors, and manufacturer representatives/agencies; evaluating and managing alternative placing methods. **Business Promotion Mixes** Recognizing the functions of business promotion; appreciating the role of integrative marketing communications through trade shows, conferences, personal selling, and other below-the line advertising tools.
Teaching/Learning Methodology	Students are encouraged to participate in class discussions for both lectures and seminars. To facilitate students' ability of lateral thinking and to apply theories, case scenarios will be stressed in teaching. Students will form groups, each of which is in charge of presenting two cases with external search of information from internet, newspapers, company annual reports etc. In addition, an individual/group assignment will be used to integrate student's understanding of all taught materials.

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		
Continuous Assessment*	**50%**						
1. Group presentation and report	10%	✓	✓				
2. Group presentation and report	15%	✓	✓	✓			
3. Individual/ group assignment	25%	✓	✓	✓	✓		
Examination	**50%**	✓	✓	✓	✓		
Total	100 %						

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

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

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: the various methods are designed to ensure that all students taking this subject –

- Read all prescribed book chapters prior to every lecture;
- Exchange ideas on the issues raised in the lectures/seminars;
- Evaluate alternative strategies/approaches in different business situations;
- Involve/participate in presentations and express views and comments on how to solve business problems.

Feedbacks will be given to students immediately after their presentation. All students are encouraged to give their views.

Student Study Effort Expected		
	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials	13 Hrs.
	Other student study effort:	
	▪ Preparation for presentation & report	48 Hrs.
	▪ Preparation for assignment/examination	50 Hrs.
	Total student study effort	137 Hrs.

Reading List and References	*Recommended Textbook:* Hutt, Michael D and Speh, Thomas W (2013) ***Business Marketing Management: B2B, Thomson South Western****,* 11th International Edition. *References:* Dwyer, Robert F and Tanner, John (2008) ***Business Marketing: Connecting Strategy, Relationships, and Learning,*** McGraw-Hill/Irwin, 4 edition Leung, T.K.P. (2010) ***Negotiate on a relationship in China,*** Lap Lambert Academic Publishing. Zhang, Wenxian and Alon, Ilan (2009) *A guide to the top 100 companies in China*, World Scientific Publishing Co Various newspapers, magazines, journal articles, company annual reports, and online information will be referenced.

Subject Description Form

Subject Code	MM4732
Subject Title	Global Marketing
Credit Value	3
Level	4
Normal Duration	1-semester
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** Introduction to Marketing (MM2711) or equivalent **Exclusion:** International Marketing (MM4731)
Role and Purposes	The purpose of this subject is to provide students a rigorous theoretical grounding against which international marketing problems and issues may be systematically synthesized, analyzed, and managed. The focus is on the analysis of the global operating environment and the management of international marketing operations. Specially, this subject contributes to the BBA Project Outcomes in transforming students to be culturally diversity and globalized, analytical, value creation, creative, ethical, and sensitive to domestic and global business environments.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. demonstrate a global outlook and an understanding of how cultural, social, economic, political, and organisational factors affect the practice of marketing in foreign countries (**BBA Outcome 2**); b. identify and evaluate opportunities for organizational expansion into new foreign markets; c. formulate effective marketing strategies in response to perceive opportunities in foreign markets (**BBA Outcome 8**); d. apply knowledge learned to the creative solution of problems confronting organizations operating in cross-cultural environments (**BBA Outcome 3**); e. appraise the social, ethical and commercial implications of implementing marketing strategies across different cultural contexts (**BBA Outcome 4**); f. exhibit leadership and interpersonal skills working together in teams to obtain creative solutions to international marketing problems (**BBA Outcome 10**).
Subject Synopsis/ Indicative Syllabus	**Global marketing environment :** Challenges of marketing in the global marketplace, the global economy, cultural and social forces, political, and legal forces **Analyzing foreign markets :** Global markets and buyers, country attractiveness, international marketing research

Developing global marketing strategies : Developing a global mindset, entry strategies, issues of standardization and adaptation

Designing global marketing programs : Global product and service strategies, managing global distribution channels, global promotion strategies, pricing for global markets

Managing global marketing process: Organizing global marketing, planning and controlling global marketing programs

Teaching/Learning Methodology

This subject is taught through a mix of lectures and tutorials. Lectures are used to explain and illustrate concepts and theories in international marketing while tutorials provide opportunities for group discussion and sharing, case study, and presentation. Active participation is expected, with activities designed to encourage the application of concepts and theories in resolving global marketing problems.

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
Continuous Assessment	**100%**						
Individual exercise/ assignment	50%	✓	✓	✓	✓	✓	
Participation	10%						✓
Group Project/ Presentation	40%	✓	✓	✓	✓	✓	✓
Total	**100%**						

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

There will be 30% marks allocated to individual writing in English in the category of"individual exercise / assignment".

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

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

The above assessment methods are designed to ensure that all students:

- Read the recommended materials
- Discuss the global marketing issues brought up in the lectures and tutorials
- Appreciate the different approaches that may be adopted in

<table>
<tr><td></td><td colspan="2">solving global marketing problems
▪ Participate in presenting the group's views on various marketing issues at the global context</td></tr>
<tr><td rowspan="7">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading & discussion</td><td>42 Hrs.</td></tr>
<tr><td>▪ Assignments & quiz/test</td><td>42 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>123 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Recommended Text

Keegan, Warren and Mark C. Green (2012). Global Marketing, 7th edition. Upper Saddle River, N.J.: Pearson/Prentice Hall.

Other Suggested Text
Academia Journals
Journal of Marketing
Journal of International Business Studies
Journal of International Marketing
International Marketing Review
International Business Review
Journal of Global Marketing

Practitioner Journals
Harvard Business Review
MIT Sloan Management Review
California Management Review
Business Horizons</td></tr>
</table>

Subject Description Form

Subject Code	ISE404
Subject Title	Total Quality Management
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Students who do not have background knowledge in quality control and quality engineering should be prepared to do additional reading.
Objectives	This subject provides students with the knowledge to 1. understand the philosophy and core values of Total Quality Management (TQM); 2. determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; 3. apply and evaluate best practices for the attainment of total quality.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies; b. measure the cost of poor quality and process effectiveness and efficiency to track performance quality and to identify areas for improvement; c. understand proven methodologies to enhance management processes, such as benchmarking and business process reengineering; d. choose a framework to evaluate the performance excellence of an organization, and determine the set of performance indicators that will align people with the objectives of the organization.
Subject Synopsis/ Indicative Syllabus	1. <u>Principles of Total Quality</u> Concepts of quality; Core values and paradigms for TQM, including corporate citizenship and protection of the environment; Models for performance excellence: Deming Prize, Baldrige Quality Award, European Quality Award 2. <u>Customer Needs</u> Internal and external customers; Voice of the customer; Customer satisfaction; Customer loyalty; Service recovery; Crisis management 3. <u>Economics of Quality</u> Classification and analysis of quality costs; Implementing quality costing systems; Economic value of customer loyalty and employee

<table>
<tr><td></td><td>loyalty
4. <u>TQM Methodologies</u>
Quality Function Deployment (QFD); Benchmarking; Business process reengineering; Process improvement
5. <u>Learning and Growth</u>
Organizational learning; Organizational renewal; Change management; Employee empowerment
6. <u>Strategic Quality Management</u>
Vision, strategy, goals, and action plans; Measurement of organizational performance</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, group discussions (tutorials), and mini-case studies are used to achieve the objectives of this subject. Some topics are taught in the classroom environment; students have to learn these topics by themselves in the process of writing problem-based assignments. Directed study is also used to develop the self-learning ability of students.</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. Assignments</td><td>35%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Tests</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3.Examination</td><td>45%</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 assignments, reflective journals, essays, and case studies facilitate the application of concepts and skills learned in analyzing and attaining total quality while emphasizing factors that may affect decisions.
Examination/tests allow students to demonstrate the extent of their understanding of concepts, as well as their abilities to analyze and solve problems related to the subject.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/Tutorial 2 hours/week for 13 weeks</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial/Case Study 1 hour/week for 13 weeks</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Studying and self learning</td><td>50 Hrs.</td></tr>
</table>
</td></tr>
</table>

	▪ Assignment and report writing	28 Hrs.
	Total student study effort	117 Hrs.
Reading List and References	1. Besterfield, DH, et.al. 2003, *Total Quality Management*, 3rd edn, Prentice Hall 2. Goetsch, DL & Davis, B 2006, *Quality Management: Introduction to Total Quality Management for Production, Processing and Services*, 5th edn, Pearson 3. Gryna FM 2001, *Quality Planning & Analysis*, 4th edn, Jr., McGraw-Hill 4. Selected articles in Quality Progress and the web site of American Society for Quality	

Subject Description Form

Subject Code	ISE419
Subject Title	Advanced Mould and Die Design
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	ISE202 Fundamentals of Manufacturing Processes or ISE301 Process Selection and Design or ISE306 Tool Design or ISE3006 Materials and Processes Selection or ISE325 Materials Processing Technologies
Objectives	This subject provides students with: 1. in-depth knowledge of the design and manufacture of complex moulds and dies for plastics and metal engineering components; 2. skills in assessing the related performance of tooling and processes; 3. the ability to evaluate the effects of tooling design on the quality of finished products.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply contemporary design principles when designing advanced moulds and dies; b. assess the performance of a given tool design based on the design criteria; c. evaluate the effects of a given tool design on the quality of the work.
Subject Synopsis/ Indicative Syllabus	1. <u>Review of Basic Tooling Design Principles</u> Consideration of advanced mould and tool design criteria; selection of mould and die materials; heat treatment and its effects on tool design. 2. <u>Net Shape Forming Dies</u> Die construction for fine-blanking and precision progressive tool, etc., special design criteria: production practicability and limitations, shear behaviour, die clearance. 3. <u>Die Casting Moulds</u> Cold and hot chamber die-casting; types of die construction; metal flow rate and pressure; cavity filling; runner and gate; overflow; venting; thermal design and analysis. 4. <u>Injection Moulds</u> Precision mould construction; melt flow analysis; moulding ejection; cooling and warpage; design for advanced plastics processing.
Teaching/Learning Methodology	The subject is taught through a combination of lectures and tutorials integrated with practical design mini-projects. The lectures provide students with in-depth knowledge of contemporary mould and die practices. Laboratory work and tutorial exercises provide students with opportunities

<table>
<tr><td></td><td>to learn and apply the teaching materials. Typical mould and die designs are demonstrated and examined to help students to become familiar with real-life practices.</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></td><td></td><td></td></tr>
<tr><td>1. Assignments</td><td>20%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Tests</td><td>40%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Mini-group projects</td><td>40%</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 assignments, which are given throughout the course, are designed to facilitate students to reflect on and apply the in-depth knowledge learnt.
The tests are designed to enable students to demonstrate their learning ability and comprehension.
Continuous assessment comprises all laboratories, tutorials, assignments, progress tests, and mini-group projects with presentations and written reports. All assessment components require students to apply what they have learnt and show their ability to apply different technologies.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>27 Hrs.</td></tr>
<tr><td>▪ Tutorials, tests, laboratory work, and mini-projects</td><td>12 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments</td><td>20 Hrs.</td></tr>
<tr><td>▪ Test preparation, mini-group projects (including presentation and report writing)</td><td>58 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>117 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>
1. Donaldson, C, LeCain, GH & Goold, VC, Tool Design, latest edition, McGraw-Hill, New York
2. Spitler, D, Lantrip, J, Nee, J & Smith, DA, Fundamentals of Tool Design, latest edition, Society of Manufacturing Engineers, Dearborn
3. Eary, DF & Reed, EA, Techniques of Pressworking Sheet Metal, latest edition, Prentice-Hal, Englewood Cliffs, New Jersey
</td></tr>
</table>

	4. Menning, G & Stoeckhert, K, *Mold-making Handbook: for the Plastics Engineer*, latest edition, Hanser Gardner Publications, Cincinnati 5. Pye, RGW, *Injection Mould Design*, latest edition, *Affiliated East-west Press Pvt Ltd*, New Delhi 6. Manzione, LT (ed.), *Application of CAE in Injection Moulding*, latest edition, Hanser Gardner Publications, Cincinnati 7. Gastrow, H, *Injection Molds: 108 Proven Designs*, latest edition, Hanser Gardner Publications, Cincinnati 8. Street, AC (ed.), *The Diecasting Book*, latest edition, Portcullis Press, Redhill, Surrey

Subject Description Form

Subject Code	ISE4007
Subject Title	Design for Soft Products and New Services
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. a basic understanding of the role of services and the importance in today's modern society; 2. the ability to apply principles and techniques in the design, planning, and control of service systems so as to make the most efficient use of available resources in achieving stated objectives, and to have an understanding of their advantages and limitations.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. apply a systems concept for the design of service systems to meet specified customer requirements; b. make forecasts of customer demand in the service sectors using selected quantitative and qualitative techniques, and to recognise their advantages and limitations; c. identify and measure capacity requirements, and be able to match them with service demand making use of suitable techniques such as queuing theory and computer simulation so as to bridge the service gap of customer expectations against actual performance; d. understand the importance and function of inventory and apply selected techniques for its control and management under specified service demand; e. have an understanding of the importance of Lean in modern service organisations, be able to recognise and apply appropriate philosophies to remove and minimise waste, and to draw up an appropriate action plan for so doing.
Subject Synopsis / Indicative Syllabus	1. <u>Introduction</u> Products and Services: Similarities and Differences, Tangible Goods and Intangible Services. The Role of Services in an Economy. Sources of Competitive Advantage: Quality (getting it Right), Speed (delivering Fast), Dependability (being on Time), Flexibility (being able to change), Cost (being efficient). Services as a Customer Experience, Eliciting Emotions, Favourable Customer Experiences. 2. <u>Designing and Managing Service Systems</u> Forecasting Service Demand; Qualitative and Quantitative methods of

Forecasting; Forecasting errors and control; Forecasting and its relationship to Capacity Planning.

3. Capacity Planning Considerations

Identification of Capacity, Measuring capacity and managing it; Short-term and Long-term. Approaches to matching capacity to match Service demand. Queuing Models and Capacity Planning, Queuing Theory and Computer Simulation, Advantages and Limitations of each.

4. Product and Service Measurement

The Reasons for Measurement. Types of Measurement. Service Quality and how can it be measured. Performance Measurement. The Service Gap: Customer Expectations verses Actual Performance.

5. Inventory Control

Types of inventory; Continuous review and periodic review systems; Reorder level and order quantities, including quantity discounts; ABC analysis

6. Application of Lean to Services

The Origins of Lean: Ohno's Toyota Production System to JIT to Lean Manufacture to the arrival of Lean Service Organisations. Recognising the types of waste in a service system and removing it. Advantages (and Limitations) of Lean. Effect on Inventory, Implementation Issues.

Teaching/Learning Methodology

A mixture of lectures, tutorial exercises, case studies and laboratory classes are used to deliver the various topics and attain the intended learning outcomes. Some of these are presented in a problem-based format which aims to enhance the learning outcomes while others are covered through directed study to enhance students' "learning to learn" ability. Tutorials and laboratories are conducted as group activities to allow students to discuss, practice, and understand materials covered during the lectures. Case studies and simulation exercises are provided to encourage students' further thinking about, and integration of, the factors related to real-life problem solving in this subject.

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. Assignments	25%	✓		✓		
2. Case Studies and Laboratory Work	25%		✓		✓	✓
3. Examination	50%	✓	✓	✓	✓	✓
Total	100%					

Assignments/case studies assess students' ability to synthesise and apply concepts and skills learned in solving problems related to the subject.

	Laboratory exercises assess students' capability in design for sift products and services so as to make the best use of available resources. The examination assesses students' understanding of the concepts and in the use of the skills in solving problems related to the subject.	
Student Study Effort Expected	Class Contact:	
	▪ Lecture	22 Hrs.
	▪ Case Studies and Laboratory Work	17 Hrs.
	Other student study effort:	
	▪ Studying and self learning	50 Hrs.
	▪ Assignments and report writing	23 Hrs.
	Total student study effort	112 Hrs.
Reading List and References	1. Robert Johnson and Graham Clark 2009, *Service Operations Management,* 1st edn, Pearson Educational Limited 2. James A. Fitzsimmons, Mona J. Fitzsimmons 2001, *Service Management,* 1st edn, Mc Graw Hill International Edition 3. Krajewski, L J and Ritzman, L P 2005, *Operations Management: Strategy and Analysis,* 7th edn, Upper Saddle River, N.J.: Pearson/Prentice Hall 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. Turner, W C et al. 2001, *Introduction to Industrial and Systems Engineering*, Beijing : Tsing Hua University: Prentice Hall 7. Jeffrey K. Liker 2004, *The Toyota Way*, McGraw-Hill	

Subject Description Form

Subject Code	ISE4009
Subject Title	Advanced Manufacturing Technology
Credit Value	3
Level	4
Pre-requisite/~~Co-requisite/Exclusion~~	(ISE3006 Materials and Processes Selection)
Objectives	This subject provides students with 1. an understanding of specific advanced and emerging manufacturing technologies employed in modern industry with an emphasis on nano-micro fabrication; 2. a basic understanding of the capabilities, limitations, and productivity of these manufacturing technologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. comprehend the merits and limitations of the taught technologies, in terms of flexibility, productivity, quality, profitability, etc. b. identify suitable manufacturing technologies for the production of some typical nano-micro components/products.
Subject Synopsis/ Indicative Syllabus	1. <u>Overview of Some Advanced Manufacturing Technologies</u> Outline of modern processes for the production of precision and/or micro components/products. Ultra-precision machining. Physicochemical machining processes. Micro-machining. Computer aided machining (CAM). Physical and chemical vapour deposition technologies. Lasers based manufacturing processes. Rapid prototyping. 2. <u>Precision Removal Processes</u> Ultra-precision machining, principles and applications, precision plastic optical products. High-speed machining. CAM. Micro electric discharge machining. Physicochemical machining. Micro-components. 3. <u>Surface Engineering</u> Chemical and physical vapour deposition (CVD, PVD), capability and accuracy, distortion and residual stresses, applications in optical and electronic devices. 4. <u>Laser Technology</u> Fundamentals of lasers. Industrial lasers. Laser materials processing for photovoltaic applications, bio-medical applications, micro-mould and die manufacture, MEMS.

<table>
<tr><td></td><td>5. <u>Rapid Prototyping Technology</u>

Commercial RP techniques and their applications: stereolithography, selective laser sintering, laminated object manufacturing, fused deposition modeling, solid ground curing, and ink jet printing techniques.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject is taught through a combination of lectures, laboratory exercises, and tutorial assignments integrated with a mini-project. The lectures introduce the student to in-depth knowledge in the current practices of advanced manufacturing technologies. The laboratory and tutorial exercises provide opportunities for student to learn and practice with guiding materials. Mini-projects promote students' ability to conduct a literature search and their self-learning skills.</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></td><td></td><td></td><td></td></tr>
<tr><td>1. Assignments</td><td>8%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Lab reports</td><td>8%</td><td>✓</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Mini-project</td><td>14%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4. Test</td><td>10%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5. Final examination</td><td>60%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>
The assignments, which are administered periodically throughout the course, are designed to facilitate students to reflect on and apply the knowledge learnt.

The laboratory exercises are designed to assess students' problem-solving skills in advanced manufacturing technology (learning outcomes (a) and (b)).

The mini-projects follow a problem-based format and include case studies, presentations, and report writing. They are designed to facilitate students to acquire the relevant knowledge and demonstrate their ability to apply different technologies. The final examination is used to assess students' individual achievement in all of the intended learning outcomes.</td></tr>
<tr><td>Student Study Effort Required</td><td>Class contact:</td><td></td></tr>
<tr><td></td><td>▪ Lectures</td><td>27 Hrs.</td></tr>
<tr><td></td><td>▪ Tutorials</td><td>6 Hrs.</td></tr>
</table>

	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Guided reading, assignments	32 Hrs.
	▪ Self-study, preparation for test and examination	40 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	1. Steve Krar and Arthur Gill 2003, *Exploring Advanced Manufacturing Technologies*, Industrial Press, ISBN 9780831131500 2. Nitaigour Premchand Mahalik (2006) *Micromanufacturing and Nanotechnology*, Springer, ISBN 3540253777 3. Dornfeld David, Lee Dae-Eun 2008, *Precision Manufacturing*, Spinger 4. Hassan Ei-Hofy 2005, *Advanced Machining Processes-Nontraditional and Hybrid Machining Processes,* McGraw-Hill 5. Journal of Microelectromechanical Systems	

Subject Description Form

Subject Code	ISE4013
Subject Title	Product Innovation and Intellectual Property
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject aims to provide students with the knowledge to use systematic inventive thinking, creative problem-solving methodology, and intellectual property basics to develop product design solutions with patent protection for real-life applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. consider various aspects that affect the development of a new product using innovative approaches; b. solve product development problems using a systematic approach. c. comprehend the intellectual property basics and patent application procedures
Subject Synopsis/ Indicative Syllabus	1. <u>Creative Thinking Techniques</u> Conceptual Blending, Mind Mapping, SCAMPER, Brutethink (Random stimulation), Whole Brain Thinking, Improvisation, Creative Problem Solving, Visual Thinking 2. <u>Idea Generation and Evaluation Techniques</u> Brainstorming, 6-3-5 method, Brainwriting pool, SIL method, Gallery method, Decision matrix 3. <u>Theory of Inventive Problem Solving (TRIZ)</u> Background, Ideal solution generation, S-curves, Stages of product/technology evolution, Contradictions, Forty inventive principles and systems thinking 4. <u>Intellectual Property Basics</u> Patent search, Documentation of invention, Provisional vs. traditional patent applications, Patent application procedures, Patent Cooperation Treaty (PCT), Application time lines, Patent claims, Prior art, Patent, infringement, Patent due diligence, Inventors, Licensing.

Teaching/Learning Methodology

This subject is conducted using an integrated problem-based learning approach. First, students are introduced to the basics of innovation and patents. Hands-on exercises are used to guide students in grasping techniques. Industrial practitioners are invited to give seminars on innovative product design and students are required to report their reflection on the seminars. Students are then divided into groups and each group is given a real life product. The students are required to go through 2 major tasks to improve and conceptually innovate the design functions. Student groups are required to conduct presentations at the end of each task to demonstrate the learning outcome.

Learning activities are carried out in the Digital Factory laboratory, which provides a self-learning, interactive, flexible, and graphic-based digital simulation environment for students to model, develop, experiment, analyze, and optimize product design.

Design Exercises

Practice exercises on various creative thinking techniques, and invention disclosure and how they can be applied in product design, development, and idea protection are conducted either in-class or as homework.

Example Final Projects

1. Improvement suggestion of existing consumer product.
2. Redesign and innovatively engineer the analyzed consumer product.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c			
1. In-class Assignments	35%	✓	✓	✓			
2. Assignments	20%	✓	✓	✓			
3. Final project	30%	✓	✓	✓			
4. Test	15%	✓	✓	✓			
Total	100%						

The in-class assignments are designed to assess students' ability to apply learned knowledge periodically throughout the class.

The assignments are designed to assess students' individual performance toward achieving intended learning outcomes.

In addition to assessing students' ability, the integrated application-oriented final project is also used to facilitate students in acquiring knowledge on different innovation techniques through team work with patent application.

Tests are used to assess the skills of students using innovative techniques to solve problems and also understanding in intellectual property.

Student Study Effort Expected	Class contact:		
	▪ Lecture	3 hours/week for 4 weeks	12 Hrs.
	▪ Tutorial/Laboratory	3 hours/week for 9 weeks	27 Hrs.
	Other student study effort:		
	▪ Preparation for assignments		33 Hrs.
	▪ Preparation for final project		40 Hrs.
	▪ Preparation for test		10 Hrs.
	Total student study effort		122 Hrs.
Reading List and References	1. Hitchcock, David 2013, *Patent Searching Made Easy : How to do Patent Searches on the Internet & in the Library*, Nolo, 6th edn 2. Durham, Alan L. 2009, *Patent Law Essentials: A Concise Guide*, Praeger, 3rd edn 3. Knight, H. Jackson 2013, *Patent Strategy for Researchers and Research Managers*, Wiley, 3rd edn 4. Thomas T. Gordon, Arthur S. Cookfair 2013, *Patent Fundamentals for Scientists and Engineers*, CRC Lewis, 3rd edn 5. Altshuller, G.S.; et al. 2005, *40 Principles: TRIZ Keys to Technical Innovation*, Technical Innovation Center, extended edn 6. Altshuller, G.S. 2000, *The Innovation Algorithm: TRIZ, Systematic Innovation and Technical Creativity*, Technical Innovation Center 7. Silva, Arlindo; Simoes, Ricardo 2011, *Handbook of Research on Trends in Product Design and Development : Technological and Organizational Perspectives,* Business Science Reference 8. Benyus, J.M. 2002, *Biomimicry: Innovation Inspired by Nature*, Perennial 9. McDonald, Kim Chandler 2013, *Innovation How World-class Innovators Rock Their Roles*, Kogan Page 10. Higgins, James M. 2006, *101 Creative Problem Solving Technique: the Handbook of New Ideas for Business***,** New Management Pub. Co., rev. edn 11. Cross, Nigel 2008, *Engineering design methods : strategies for product design*, 4th edn, J. Wiley & Sons 12. Fogler, H. Scott 2014, *Strategies for creative problem solving,* 3rd edn, Prentice Hall 13. Mann, D. 2002, *Hands-On Systematic Innovation*, CREAX Press		

	14. Pahl, Gerhard; Beitz, Wolfgang and Wallace, Ken., 2007, *Engineering Design: a Systematic Approach*, Springer, 3rd edn. 15. Rantanen, K. and Domb, E. 2008, *Simplified TRIZ*, Saint Lucie Press, 2/e 16. Savransky, S. D. 2000, *Engineering of Creativity: Introduction to TRIZ Methodology of Inventive Problem Solving*, CRC Press 17. Ekekwe, Ndubuisi; Islam, Nazrul; IGI Global, 2012, *Disruptive Technologies, Innovation and Global Redesign Emerging Implications*, Information Science Reference 18. Gadd, Karen, 2011, *TRIZ for Engineers : Enabling Inventive Problem Solving*, Wiley 19. Timokhov, V.I. 2002, *Natural Innovation: Examples of Creative Problem-Solving in Biology, Ecology and TRIZ,* Creax, University of Bath 20. Van der Ryn, S. 2007, *Ecological Design*, Washington, D.C., Island Press, 10th anniversary edn. 21. http://www.creax.com

Subject Description Form

Subject Code	MM4721
Subject Title	Marketing Management in China
Credit Value	3
Level	4
Normal Duration	1-semester
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** Introduction to Marketing (MM2711) or equivalent
Role and Purposes	This subject is designed to develop the students' understanding of China's marketing environment and marketing system. Specifically, it aims to provide a background for the critical appreciation of the opportunities available and for effective implementation and coordination of marketing mix programs in the vast China market. Students will be introduced a set of principles by which practicing managers can assess the burgeoning China market scientifically and thoroughly.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand the idiosyncrasies of China's business environment and the characteristics of Chinese customers', both individual and organizational, buying behaviour and their implications for the formulation of effective marketing strategies. (**BBA Outcome 2**) (b) Evaluate alternative market entry strategies for the China market. (c) Explore and describe opportunities in the China market.(**BBA Outcome 2**) (d) Identify critical strategic and marketing management issues in the unique context of China's marketing environment. (**BBA Outcome 3**) (e) Benchmark the marketing approaches and techniques adopted by both local and foreign companies which have demonstrated excellent performance in China. (f) Identify both market-based and administration-based constraints on effective marketing operations in China.(**BBA Outcomes3 & 10**) All these will ultimately enhance the all-round development of students in appreciation of cultural and other environmental influences on marketing practice and the abilities in critically analyzing marketing opportunities in new markets and in applying modern marketing techniques in a mixed economy with socialist character in creative and flexible manner.

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>
Understanding the Marketing Environment in China
Unique features of the China market. The dynamics and market potential of the China market. The interactions between the marketing environment and the macro-environment. The implications of building a market economy with socialist character for effective marketing management in China. Regional disparity in culture, level of economic development, and business behavior. Possible impacts of WTO and CEPA on the China market.

Marketing Research in China
Sources of information. Legal and ethical issues. The information market in China. Attitudes of Chinese people towards marketing research. The implications of the above issues for research design. Problems associated with the implementation of marketing research activities in China and interpretation of collected data.

Understanding Chinese Buyers
Distinctive characteristics of Chinese buyers' purchasing behavior. Cultural impact on buying behavior. Changes in consumption patterns and the forces underlying such changes. The concept of 'guanxi' and its implications for the understanding of Chinese buyers' purchasing behavior. The Children market in China.

Entry Strategies for the China Market
Reforms in both foreign trade and distribution areas. Scenario of the existing distribution system. Characteristics of channel members' marketing behavior. Evaluation of alternative entry strategies.

Designing the Marketing Program
Issues concerning adaptation of Western marketing principles in China. Advertising in China. Price reforms and their impact on pricing behavior. Developing and managing new products for Chinese customers. Logistics management in China. Promotion management in China. Impact of WTO on the country's marketing channels.
</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures and seminars are utilized. In the seminars, cases and other project oriented work involving the analysis of marketing management activities in China are used.</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 (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td><td>e.</td><td>f.</td></tr>
<tr><td>Continuous Assessment*</td><td>50%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1. Marketing Case Analysis and Tutorial Questions</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
</table>
</td></tr>
</table>

2. Benchmarking project	30%	✓	✓	✓	✓	✓	✓
Examination	**50%**	✓		✓	✓		✓
Total	100 %						

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

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

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: the various methods are designed to ensure that all students taking this subject –

There is no textbook which is well-structured and well-organized to reflect the latest development of the China market and the unique market characteristics and associated marketing and management issues. Therefore, the use of empirical research papers and management reports and real-life cases published in the past few years is more effective in explaining the current market situations and related marketing management challenges to students. This approach ensures the achievement of learning outcome a, b, c, d, and f.

In addition, each student is asked to work in a team to evaluate a selected firm's marketing strategy that has been adopted in China, preferably less than 3 years. This provides students with another opportunity to learn the updated situation of the China market and how to identify the marketing and management problems derived from the unique characteristics of the China market. Through the evaluation of the market performance of the product/brand/firm, students can benchmark both excellent and inappropriate marketing practice in China. This assessment component enables us to achieve all the desired learning outcomes.

An examination which only uses essay questions is not appropriate for this subject in the context of the aforesaid learning outcomes. However, the final examination for this subject is specifically designed to combine both essay and application questions and mini-case analysis. This format enables us to achieve the desired learning outcomes, particularly outcome a, d, e, and f.

Student Study Effort Expected	Class contact:	
	▪ Lecture (2 hours) and tutorial (1 hour)	39 Hrs
	Other student study effort:	
	▪ Group discussion and research	42 Hrs

	▪ Writing reports and prepare presentation PPTs	56 Hrs
	Total student study effort	137 Hrs.
Reading List and References	Atsmon, Dixit, Magni, and St-Maurice (2010), ***"China's New Pragmatic Consumers,"*** The McKinsey Quarterly Baker, Mark and Orsmond, D. (2010), ***"Household Consumption Trends in China"***, March Quarter, Reserve Bank of Australia. Batra, R. (1997), "Marketing Issues and Challenges in Transitional Economies", ***Journal of International Marketing*****,** Vol. 5(4), p95-114. Bliss, C., Haddock, R., Winkler, C. and Grichnik, K. (2009), ***"China's Shifting Competitive Equation: How Multinational Manufacturers Must respond"***, Booz, Allen and Hamilton. Chan, Kara (2006), "Store Visits and Information Sources among Urban Chinese Children," ***Journal of Consumer Marketing***, Vol.22(4), p178-188. China's Digital Generations 2.0: Digital Media and Commerce Go Mainstream, by ***The Boston Consulting Group***, May 2010. ***Chinese Consumer Report 2009 and 2010.*** Roland Berger. Devan, Negri, and Woetzel (2008). ***"Meeting the Challenges of China's Growing Cities"***, The McKinsey Quarterly. Huang, M. and Tsang, Alex (2010), "Development and Current Issues Related to Internet Marketing Communications in China," ***Journal of Interactive Advertising*****,** Vol.11(1):1-10. Li, Caroline and Li, Julie (2008), "Achieving Superior Financial Performance in China: Differentiation, Cost Leadership, or Both?" ***Journal of International Marketing*****,** Vol.16(3), p1-22. Luk, Sherriff T.K., 'Structural Changes in China's Distribution System', ***InternationalJournal of Physical Distribution and Logistics Management***, Vol. 28, No. 1, pp.44-67,1998. Roy, Abhik, Walters, Peter, and Luk, Sherriff (eds.), 'Special Issue on Doing Business in China', ***Journal of Business Research***, Vol.52, No.2, 2001. Timberlake, Josh, Schneider, Phil, and Terry, S. D. (2009), "China: Still Manufacturing's Shining Star?" ***Deloitte Review***, Issue 5. Sin, Tse, Yau, Lee, and Chow (2004), "Market Orientation and Business Performance in the PRC: A Regional Comparison," ***Journal of Global Marketing***, Vol.17, No.2/3, pp55-89. Teo, Piotroski, and Nunnes (2007), "Why Wining the Wallets of China's Consumers is Harder than You Think," ***Outlook***, September, Accenture.	

	Tse, Edward, *'The Right Way to Achieve Profitable Growth in the Chinese Consumer Market'*, Strategy and Business, Second Quarter, Booz-Allen & Hamilton Consultant Co. Ltd, 1998. Tse, Edward (2006), "*Developing a China Strategy that Delivers Results*," Booz, Allen and Hamilton. Uncles and Wang, (2010), "A Temporal Analysis of Behavioral Brand Loyalty among Urban Chinese Consumers", *Journal of Marketing Management,* 921-942. Yu, J. and Zhou, Joyce (2010), "Segmenting Young Chinese Consumers Based on Shopping-Decision Styles: A Regional Comparison," *Journal of International Consumer Marketing*, Vol.22, 59-71

Subject Description Form

Subject Code	MM4781
Subject Title	Sales Management
Credit Value	3
Level	4
Normal Duration	1-semester
Pre-requisite/Co-requisite/ Exclusion	**Pre-requisite:** Introduction to Marketing (MM2711) or equivalent
Role and Purposes	This subject is designed for students who desire a better grounding in the current theories and practices for developing and managing a sales force. The subject aims to study the topics of sales management from three perspectives: ▪ The *first* perspective is to study the subject area from a managerial point of view. ▪ The *second* one is to study the subject from a selling process approach. ▪ *Finally*, the third perspective is to examine the relationship selling in international context. The subject will also develop students' creative thinking and CRM skills.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. identify the nature of *managerial work* in a variety of forms of organization, and assess the impact of the external environment on managers' jobs. (**BBA Outcome 2**) b. understand the essence of *human and CRM behavior* and be able to assess the implications for the management of organizations and businesses. Understand essential elements of the *selling process*. Be able to evaluate the arguments surrounding social responsibility and ethical behaviour in business, and an enhanced awareness of the importance of such issues. c. apply concepts of sales management to *issues* related to international operations, for example, selling to the PRC market and global key account management. Have further developed their critical and creative thinking, and oral and written communication skills. (**BBA Outcomes 3, 4 & 9**)
Subject Synopsis/ Indicative Syllabus	**Nature and Scope of Sales Management** Sales-force management in the total marketing programme. Relationship between sales management and other marketing and managerial functions. Responsibilities of the sales manager. Sales environment. To discuss sales management's tasks in a company with a customer orientation and outline its roles in relation to other marketing mix variables.

	Students are expected to know how the nature of sales management has changed, what managerial challenge face sales managers and how environmental factors affect the sales activities of the company. **Essentials of the Selling Process** Key steps of the selling process: prospecting, preparation, presentation, handling objections, closing the sale and follow-up activities. To trace the evolution of modem selling and discuss the roles of personal selling today. Students are expected to have key ideas about typical problems encountered in doing personal selling and how they can be resolved. Extensive use will be made of role playing exercises. **Sales Management for International Operations** Customer analysis; roles and responsibilities of sales force in overseas markets: sales planning and control in foreign markets. Sales management for the PRC market. Emphasis will be placed on how to build relationships with businessmen in the Mainland China. To discuss the roles of sales management when operating in the international business context. In this perspective, different types of international sales organizations will be examined. Analysis as to how sales activities are affected by situational factors, and differences in consumer and organizational behavior, etc., will also be developed.
Teaching/Learning Methodology	Students are encouraged to participate in class discussions for both lectures and seminars. They are required to finish weekly reading assignments before the lecture. To facilitate students' ability to apply theories, case studies will be stressed in teaching, including cases assigned for discussion in class and a project assigned as field work. Students are required to form groups to conduct the projects dealing with real firms. Formation of student groups and topics for case studies will be discussed in detail during class and consultation hours.
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			
Continuous Assessment	**50%**						
1. In-class participation	15%	✓	✓	✓			
2. Group Assignment	10%		✓	✓			
3. Group Project	25%		✓	✓			
Examination	**50%**	✓	✓	✓			
Total	100 %						

	Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.* To pass this subject, students are required to obtain Grade D or above in **BOTH the Continuous Assessment and Examination components. **Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:** the various methods are designed to ensure that all students taking this subject – ▪ Understand and analyse the issues and concepts of sales management; ▪ Read relevant chapters of the recommended textbook and other relevant learning material including research journal articles, cases & reports, etc. ▪ Appreciate alternative approaches, perspectives and theories to deal with various sales management issues; ▪ Undertake critical reflective thinking and practice about innovative ways of thinking and new ways of selling and CRM building Feedback is given to students after they have presented their view and all students are invited to join this discussion.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Seminars	13 Hrs.
	Other student study effort:	
	▪ Preparation for discussion	42 Hrs.
	▪ Preparation for project/assignment/tests	42 Hrs.
	Total student study effort	123 Hrs.
Reading List and References	*Textbook* Johnston M & Marshall G, ***Relationship Selling***, 2nd edition, McGraw Hill, 2008. *Key Reference* Futrell, C., ***ABC's of Relationship Selling, 6th edition*****,** McGraw-Hill, 2003 Wong, Y.H. and Leung, T.K.P. (2001), ***Guanxi Relationship Marketing in a Chinese Context***, International Business Press, The Haworth Press, New York, London. *Other References* Johnston M & Marshall, ***Sales Force Management***, 7th edition, McGraw Hill, 2003. Ingram T. N., LaForge R. W. & Schwepker C. H. ***Sales Management: Analysis and Decision Making***, 5th edition, Dryden, 2004.	

SD4463 Sustainable Product Design

Discipline Elective

Year	3/4
Level	4
Credit value	3
Contact hours	39

Pre-requisites
Nil

Co-requisites
Nil

Exclusions
Nil

Objectives

This subject aims to enable students to explore and practice product design via a sustainable solution approach, and introduce them with system design thinking. Students will learn to develop products from a broader social and ecological context. Through seminars and group tutorials, students will also be introduced to the concepts of design for environment (DfE), design for sustainability (DfS), system-product design (SpD) and basic sustainable product design strategies.

Intended learning outcomes

Upon completing the subject, students will be able to:

Professional skills

1. recognise the significance of solution-based design and system design thinking in the practice of industrial design;
2. critically analyze a given design problem or a model sustainable solution;
3. formulate eco-design strategies based on the given problem or sustainable solution;
4. produce an eco-friendly design via lifecycle thinking and appropriate eco-design strategy;
5. practice visualization, 3D modeling, product's form and material selection in design production.

Transferable skills

6. Social/cultural appreciation, critical and creative thinking, leadership and entrepreneurship.
7. System thinking, project management and presentation skills.

Subject synopsis

Students will be introduced to:

Design for Environment (DfE)

- notion of 'sustainability';
- basic idea of eco-design/Design for Environment (DfE);
- concept of lifecycle thinking;
- 4 DfD strategies;

Design for Sustainability (DfS)

- the '4r' and '4R';
- function-based/solution-based design;
- concept of 'Design for Sustainability' (DfS);
- idea of 'system' and the concept of 'system design' thinking;
- basic concept of Product-Service System (PSS) & System-product Design (SpD).

Teaching and learning methods

Activity	Purpose
Lecture	To introduce students to theories and principles related to the topic.
Workshop	Putting principles into practice with short in-class exercises
Seminar	To discuss assigned readings related to the topic, expanding students' contextual knowledge

Tutorial	To guide students on the development of projects, individually and in small groups
Critique	To allow students to learn from the strengths and weaknesses of their peers and to provide a framework for evaluating the effectiveness of the students' projects from various perspectives

Assessment methods

	Assessment task	Weighting	Learning outcomes to be assessed 1	2	3	4	5	6	7
1	Workshop 1: LCA	20%	•	•	•	•	•		
2	Workshop 2: mental modeling	20%		•	•	•	•		
3	Design Project	60%			•	•	•	•	•
	Total	100%							

Purposes
The ability to recognize the essential idea of life-cycle thinking
The ability to analysis the environmental quality of a given product with simplified LCA tool
The ability to analyze a given problem or a sample solution in systematically and critically
The ability to apply the learning of solution-based and system design thinking in the process of design
The ability to apply knowledge of lifecycle thinking and to formulate appropriate eco-design strategy
The ability to make appropriate choices of materials, process and product form and capable to visualize design in professional drawings and 3D models in the process of design
The ability to produce appropriate/ creative design and manage design process in a professional manner

Student study effort expected

		hours
	Class contact	
1	Lecture	10
2	Group Tutorial	18
3	Workshop	11
	Other student study effort	
1	Self-study	18
2	Project work	45
	Total student study effort	**102**

References

Books

Leong, B.D., & Manzini, E. (2006). Design vision: The sustainable way of living in China. Guangzhou, China: Lingnan Art Publishing.

Martin Charter & Ursula Tischner (2001). Sustainable solutions: Developing products & services for the future. UK: Greenleaf Publishing.

W. McDonough & M. Braungart (2002). Cradle to cradle: Remaking the way we make things. New York: North Point Press.

Papanek, Victor (1995). The green imperative. New York: Thames and Hudson.

Helen Lewis & John Gertsakis (2001). Design + environment: A global guide to designing greener goods. UK: Greenleaf Publishing.

Alastair Fuad-Luke (2002). Eco-design: The sourcebook. San Francisco: Chronicle Books.

Internet references/web sites

O2 Global Net. http://www.o2.org

Centre of Sustainable Design. http://www.cfsd.org.uk

Eco-concept. www.econcept.org

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

Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. (TM8057) 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. 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.
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 Required

Class Contact	**TM8057**	**TM2009**	**TM1116**	**TM0510**	**TM3014**
▪ Mini-lecture	12 Hrs.	7 Hrs.	3 Hrs.	6 Hrs.	6 Hrs.
▪ In-class Assignment/ Hands-on Practice	36 Hrs.	8 Hrs.	6 Hrs.	24 Hrs.	12 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. **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	IC348
Subject Title	Appreciation of Manufacturing Processes
Credit Value	3 Training Credits
Level	3
Pre-requisite	IC2105/IC287
Objectives	This subject aims at developing students' understanding on: - • the principles and operations of common manufacturing processes, and • the properties and application of common materials.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) demonstrate a holistic understanding on the working principle, capability and operation of different manufacturing processes. *(Objective 1 and Syllabus Item 1-9). Category A*; b) justify appropriate manufacturing processes for specific product requirements. *(Objective 1 and Syllabus Item 1-9). Category A*; c) select and use various common engineering materials for specific purpose. *(Objective 1 and Syllabus Item 1-9). Category A*; and d) collaboratively complete an application oriented project through group work and discussions, and discuss current industrial practices and technologies *(Objective 1 and Syllabus Item 1-9). Category B.*
Subject Synopsis/ Indicative Syllabus	**Outline Syllabus**: 1) Properties and uses of common materials including ferrous metal, non-ferrous metals, and polymers. 2) Working principles and operation of metal removal processes including turning, milling, CNC machining, and electro-discharge machining. 3) Working principles and operation of common production processes including casting methods for metal parts, and plastic injection moulding. 4) Working principles and operation of arc welding and gas welding. 5) Working principles and operation of common sheet metal parts manufacturing processes including blanking, forming, and turret pressing. 6) Working principles, operation, and comparison of surface-finish processes including electro-plating, and aluminium anodising. 7) Application of dimensional and geometrical measuring tools.

<table>
<tr><td>Learning Methodology</td><td>The teaching and learning methods include tutorials, demonstrations, hands-on training, and report writing for the mini-project. Assignments require both “group effort” and “individual effort”.

An integrated mini-project type of work will be employed in a holistic approach to enable students to appreciate the processes and materials selected for the project through hands-on practical work. Students will be divided into groups with each consists of 5 to 6 members. An IC staff will be allocated to each group as its mentor who is responsible to provide students with advice and guidance in understanding the processes concerned and helping them to solve the problems encountered throughout the training. Periodic mentor sessions will be arranged for the mentors to stretch the students’ intellectuals and technical ability.</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. Individual Workshop Assignment</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Group Project</td><td>20</td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>3. Group Presentation</td><td>10</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>4. Individual Report</td><td>30</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100</td><td colspan="4"></td></tr>
</table>
The Individual Workshop Assignment is aimed at assessing student’s performance and practical ability in using various processes to produce the components for the project.

The Group Project is aimed at assessing students’ self-learning, organization, project management and problem solving capability.

The Group Presentation is designed to facilitate students to demonstrate their understanding in product development workflow.

The Individual Report is aimed at assessing student’s appreciation and understanding on all the processes involved in the project.</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td colspan="2">Class Contact</td></tr>
<tr><td>▪ Workshop training /Hands-on Practice</td><td rowspan="2">112 Hrs.</td></tr>
<tr><td>▪ Induction /Mentor Sessions /Presentation</td></tr>
<tr><td>Other Study Effort</td><td></td></tr>
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	▪ Presentation preparation/Report Writing	8 Hrs.
	Total Study Effort	**120 Hrs.**
Reading List and References	Reading Materials published by the Industrial Centre : 1. Metal Cutting 2. CNC Machining 3. Non-Conventional Machining 4. Hot Metals Processing 5. Plastics Processing 6. Sheet Metal Processing 7. Surface Finishing	

Subject Description Form

Subject Code	IC349
Subject Title	Integrated Manufacturing Project
Credit Value	3 Training Credits
Level	3
Pre-requisite	IC348
Objectives	This subject aims at developing students' ability in applying and integrating the engineering knowledge and practical experience that acquired from the related engineering subjects and the industrial training. Through undertaking group projects, students would be able to appreciate all the stages involved in handling a manufacturing project including: Design and Drafting, Costing, Project Planning and Control, Manufacturing, Assembly, Testing and Evaluation. The subject also provides opportunity for students to develop their personal and professional qualities such as leadership, communication skill, co-operative attitude, and co-ordination ability as well as enthusiasm for accepting technical responsibility.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply engineering knowledge in carrying out an industrial project starting from design, drafting, process planning, costing, manufacturing, QC and inspection, down to assembly, testing and evaluation; b. select and use appropriate technology building blocks, components and manufacturing processes to develop a solution for an industrial problem; and c. develop personal and professional qualities such as leadership, communication skill, co-operative attitude, and co-ordination ability as well as enthusiasm for accepting technical responsibility.

Subject Synopsis/ Indicative Syllabus	All projects assigned will be of 'real' work basis selected from various Units in IC or certain customers from the industry. Typical projects are automated devices or systems 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.
Learning Methodology	Students will be divided into groups to work on projects that are required to satisfy an existing demand in IC or a certain customers from the industry. The project are divided into two stages:- • The Design Stage During this period, the project team, under the guidance of the supervisors and clients, have to discover, understand and analyze the requirement of the project; and apply their knowledge to design a solution for this problem. Furthermore, students are required to search and track down parts and components with suppliers to obtain materials for the following manufacturing stage. • The manufacturing stage The entire project highly emphases on personal commitment, cooperation and coordination among team members. Each team member is responsible for undertaking a certain part of the project which will eventually get together to form the final assembly. For projects collaborating with customers from the industry, students are required to work for an additional two weeks in the summer if they wish to claim their projects as WIE equivalent. This ensures that they would have enough time to discuss with the industrial client and to solve problems that may arise during project installation and commissioning.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed		
		a	b	c
1. Performance	40	✓	✓	✓
2. Report	20	✓	✓	✓
3. Oral Presentation	20	✓	✓	✓
4. Reflective Journal	20	✓	✓	
Total	100			

In each of the assessment components above, it consists of both "group work" and "individual work" to reflect the student's performance.

Performance is to assess how well the deliverable of the project meets with client's requirement in terms of completeness, functionality, and accuracy in order to reflect the intended learning outcomes (a) & (b).

Reports allow students to provide periodic review on the project progress and to ensure the design can be completed before the commencement of the manufacturing stage. Assessment of the final report will focus on the adequacy of the technical content, clarity and fluency of the presentation, discussion, comment and recommendation. It is used to assess students' ability in attainment of learning outcomes (a), (b) and (c).

Oral Presentations allow 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. It is appropriated for the assessment of all intended learning outcomes.

Individual Reflective Journal is to facilitate students to review and sum up the activities and processes of the project holistically of their contribution.

Student Study Effort Required

Class Contact	
▪ Tutorial / Hands-on Practice	104 Hrs.
▪ Workshop Training	
▪ Project Presentation / Documentation	
Other Study Effort	
▪ Reading and Project Preparatory Work	16 Hrs.
Total Study Effort	**120 Hrs.**

Reading List and References	Reading Materials published by the Industrial Centre : 1. Metal Cutting 2. CNC Machining 3. Non-Conventional Machining 4. Hot Metals Processing 5. Plastics Processing 6. Sheet Metal Processing 7. Photo-chemical Machining 8. Surface Finishing

Subject Description Form

Subject Code	IC3102
Subject Title	Integrated Product Engineering Project II
Credit Value	3 Training Credits
Level	3
Pre-requisite	
Objectives	This subject aims at developing students' ability in applying and integrating the engineering theories and practices acquired from the related engineering subjects and the Industrial Training. Through undertaking group projects, students would be able to appreciate all the stages involved in handling a product-based project including: Design and Drafting, Costing, Project Planning and Control, Manufacturing, Assembly, Testing and Evaluation. The subject also provides opportunity for students to develop their interpersonal and communication skills.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply engineering knowledge in carrying out an industrial project starting from design, drafting, process planning, costing, manufacturing, QC and inspection, down to assembly, testing and evaluation; b. select and use appropriate technology building blocks, components and manufacturing processes to develop a solution for an industrial problem; and c. communicate, cooperate, and collaborates as a team member.
Subject Synopsis/ Indicative Syllabus	All projects assigned will be of 'real' work basis, which typically are product, selected from various Units in IC or certain customers from the industry. In these projects, students are required to solve a real problem which is also of great interest to the clients. In solving the problem, they have to achieve various milestones step-by-step starting from problem identification, engineering design, material procurement, costing, manufacturing onwards up to assembly, testing and evaluation.

Learning Methodology	Students will be divided into groups to work on projects that are required to satisfy the pre-described criteria by IC and/or a customer from the industry. At the commencement of the project, there is an introductory briefing /tutorial classes are given to provide guidelines and assistance in conducting the project. The project are divided into two stages:- • The design stage During this period, the project team, under the guidance of the supervisors and clients, have to apply knowledge in carrying out a project starting from concept design, drafting of concept, process planning and costing. Furthermore, students are required to select appropriate technology, components and manufacturing processes to develop their solution. • The manufacturing stage Each team member is responsible for undertaking a certain part of the project from manufacturing, QC and inspection, assembly, testing and evaluation. The entire project highly emphases on personal commitment, cooperation and coordination among team members. For projects collaborating with customers from the industry, students are required to work for an additional two weeks in the summer if they wish to claim their projects as WIE equivalent. This ensures that they would have enough time to discuss with the industrial client and to solve problems that may arise during project installation and commissioning.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed		
		a	b	c
Progress	40	✓	✓	✓
Report	20	✓	✓	✓
Oral Presentations	20	✓	✓	✓
Reflective Journal	20	✓	✓	
Total	100			

In each of the assessment components above, it consists of both "group work" and "individual work" to reflect the student's performance.

Performance is to assess how well the deliverable of the project meets with client's requirement in terms of completeness, functionality, and accuracy in order to reflect the intended learning outcomes (a) & (b).

Reports allow students to provide periodic review on the project progress and to ensure the design can be completed before the commencement of the manufacturing stage. Assessment of the final report will focus on the adequacy of the technical content, clarity and fluency of the presentation, discussion, comment and recommendation. It is used to assess students' ability in attainment of learning outcomes (a), (b) and (c).

Oral Presentations allow 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. It is appropriated for the assessment of all intended learning outcomes.

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Student Study Effort Required	**Class Contact**	
	▪ Tutorial / Hands-on Practice	104 Hrs.
	▪ Project Presentation / Documentation	
	Other Study Effort	
	▪ Reading & Preparation Work for project	16 Hrs.
	Total Study Effort	**120 Hrs.**
Reading List and References	Reading Materials published by the Industrial Centre : 1. Metal Cutting 2. CNC Machining 3. Non-Conventional Machining 4. Hot Metals Processing 5. Plastics Processing 6. Sheet Metal Processing 7. Photo-chemical Machining 8. Surface Finishing	