THE HONG KONG POLYTECHNIC UNIVERSITY

Department of Mechanical Engineering

Master of Science (MSc)

in

Automotive Engineering Design

Mode of Study: Full-time Mode (Self-financed)

Programme Code: 43096-AEF

Definitive Programme Document

(For 2015 Cohort)

August 2015

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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 A PROGRAMME SCHEME

1. PREAMBLE

The Hong Kong Polytechnic University (PolyU) aspires to become the “Preferred University” offering “Preferred Programmes” and producing “Preferred Graduates” for Hong Kong and its surrounding regions. The Department of Mechanical Engineering (ME) strives to lead this effort to produce graduates that can meet the challenges of the 21st century. Thus, this programme is designed as a preferred programme for preferred graduates in the Automotive Engineering and Design Industry.

Hong Kong has been well recognized as one of the biggest financial centres in the World, its location allows its possibility of becoming a logistics and transportation hub among other countries in Asia. Furthermore, Hong Kong has been an essential world trade platform for many years because of its well established international networks, healthy infrastructures and legal systems that provide a channel for foreign businesses to enter into the China market. China is now the world's fastest-growing auto market that tantalizes automakers with its potential for growth and profits. Currently, the demand on supplying automotive engineering professionals in China’s market is urged by the fast expansion in design and manufacturing of its own brand vehicles locally. The Hong Kong Auto Parts industry has also been expanding recently.

Most local firms have operated in original equipment manufacturer (OEM) mode with their manufacturing base in Pearl River Delta (PRD) region. Some bigger firms have gradually begun to operate in original design manufacturer (ODM) mode and even their own brands (OBM mode) that focus on designing high value-added products. Besides, with the benefits from the signing of the Closer Economic Partnership Arrangements (CEPAs) in different stages, they have provided a lot of opportunities for local automotive part and accessory industry, including interior products, in China. Although many foreign automotive manufacturing companies have shifted their production lines to China, the skills of car component designers are still kept in the company’s host country. China is only implementing the part assembling and manufacturing tasks (OEM mode), meaning that there is no solid technology transfer from the foreign investors to the Chinese mainland.

In this regard, the demand on developing technologies for automotive engineering design to support the growth of this emerging industry is in urgent need. Since Hong Kong has not been a manufacturing hub of Asia for quite a while with most manufacturing works being shifted into China, the dependence on production of automotive parts and components has become unrealistic in maintaining the past profits of local automotive engineering and design related companies. Therefore, providing talents in the areas of automotive component design and engineering to support the development of advanced technology for automotive industry is essential. Given that many car design and manufacturing companies have been planning to establish their research and design (R&D) stations for auto-parts and accessories in Hong Kong and the PRD region, the production of graduates with substantial knowledge in automotive engineering and design, car dynamics, auto-parts design and manufacturing with some management skills is important in the coming years. It is foreseeable that China will be the one of the biggest car manufacturing and R&D bases in the world.

This is a unique programme in Hong Kong and the Southeast Asia region which aims at producing knowledge-based engineers, designers and management in the automotive industry and supporting sectors.

2. GENERAL INFORMATION

2.1 Programme Title and Programme Code

Master of Science in Automotive Engineering Design (43096)

2.2 Host Department

Department of Mechanical Engineering

2.3 Award Title

Master of Science in Automotive Engineering Design

2.4 Medium of Instruction

English

2.5 Mode of Attendance

Full-time mode

2.6 Normal and Maximum Periods of Registration

Mode of Study	Normal Duration of Study	Maximum Period of Registration[@]
Full-time	1 Year (Non-dissertation option) 2 Years (Dissertation option)	4 Years

[@]*Please refer to Section 5.3.1.*

2.7 Entrance Requirements

A Bachelor's degree with Honours in engineering or product design discipline, or qualifications that satisfy the academic requirements for Corporate Membership of the Hong Kong Institution of Engineers (HKIE), or an equivalent qualification.

Consideration will also be given to candidates without Honours degrees but with other relevant qualifications that are supplemented by appropriate work experience.

If you are not a native speaker of English, and your Bachelor's degree or equivalent qualification is awarded by institutions where the medium of instruction is not English, you are normally required to fulfil the following minimum English language requirement:

- A Test of English as a Foreign Language (TOEFL) score of 80 for the Internet-based test or 550 for the paper-based test; OR
- An overall Band Score of at least 6 in the International English Language Testing System (IELTS); OR
- Other equivalent qualifications.

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

3.1 Programme Rationale and Aims

There is no doubt that China will be one of the largest automotive markets in the world. This will create demand for developing technologies in areas including car design, advanced reverse engineering, computer-aided technology, hybrid-powered technology, environmental friendly technology, advanced and light materials, manufacturing processes, effective management skill, electrical and computing engineering, and transportation technology to support the growth of the automotive engineering. This unique programme thus aims at providing students with advanced knowledge and state-of-the-art technology to prepare them to work in the automotive engineering and design industry, particularly in car engineering design, in the Southeast Asia region. This programme is offered to local, mainland China and overseas students who are working/will work in the automotive industry and supporting sectors. This is also the only programme of its type in Hong Kong and the Southeast Asia region.

The Programme Aims are listed as follows:

(a) To provide students with knowledge in automotive structures and systems;
(b) To enhance students with knowledge in car design and development;
(c) To enrich students' practical experience in car design and manufacturing; and
(d) To provide students with information on global development in automotive engineering and design.

3.2 Relationship of Programme Aims to University Missions

This programme has been designed to fulfil the University mission statements:

UM1. To nurture graduates who are critical thinkers, effective communicators, innovative problem solvers, lifelong learners and ethical leaders.

UM2. To advance knowledge and the frontiers of technology to meet the changing needs of society.

UM3. To support a University community in which all members can excel through education and scholarship.

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

Programme Aims	University Mission (as stated in Section 3.2)		
	UM1	UM2	UM3
(a)	√	√	√
(b)	√	√	√
(c)	√	√	√
(d)	√	√	√

3.3 Relationships of Programme Intended Learning Outcomes with Programme Aims and Institutional Learning Outcomes

The institutional learning outcomes for taught postgraduate programmes are:

(a) **Professional competence of specialists/leaders of a discipline/profession:** Graduates of PolyU taught postgraduate programmes will possess in-depth knowledge and skills in their area of study and be able to apply their knowledge and contribute to professional leadership.

(b) **Strategic thinking**: Graduates of PolyU taught programmes will be able to think holistically and analytically in dealing with complex problems and situations pertinent to their professional practice. They will be versatile problem solvers with good mastery of critical and creative thinking skills, who can generate practical and innovative solutions.

(c) **Lifelong learning capability**: Graduates of PolyU taught postgraduate programmes will have an enhanced capability for continual professional development through inquiry and reflection on professional practice.

The intended learning outcomes for this programme are:

(a) **Professional competence of specialists/leaders of a discipline/profession and design capability**: Graduates will possess state-of-the-art knowledge and skills in the area of Automotive Engineering Design and be able to apply their knowledge and contribute to professional competence, including ability to design and develop the auto-parts and accessories, system, component or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability. They will have the readiness for assuming a leadership role in their field of practice.

(b) **Critical and creative thinking**: Graduates will be able to think holistically, critically and creatively in dealing with complex problems and situations pertinent to their professional practice. They will be versatile problem solvers with good mastery of critical and creative thinking skills, who can generate practical and innovative solutions to novel problems.

(c) **Lifelong learning capability**: Graduates will have recognition of the need for, and an ability to engage in life-long learning.

The following table shows the relationship between programme intended learning outcomes and programme aims.

Programme Intended Learning Outcomes (as stated in Section 3.3)	Programme Aims (as stated in Section 3.1)			
	(a)	(b)	(c)	(d)
(a)	√	√	√	√
(b)	√	√	√	√
(c)	√	√	√	√

The following table shows the relationship between programme intended learning outcomes and institutional learning outcomes.

Programme Intended Learning Outcomes (as stated in Section 3.3)	Institutional Learning Outcomes (as stated in Section 3.3)		
	(a)	(b)	(c)
(a)	√		
(b)		√	
(c)			√

3.4 General Approach to Teaching, Learning and Assessment

This programme has decided that a coherent curriculum with emphasis on the integration be developed. The subjects and projects demonstrate a variety of teaching and learning approaches including lectures, laboratory works, tutorials, practical exercise, case studies/mini-projects, group discussions, written reports, oral presentations, and site visits etc..

Assessment will serve as prompt and useful feedback to students. Students will be informed of their performance in the assessment so that they are aware of their progress and attainment to facilitate teaching and learning. Students' performance in a subject will be judged by continuous assessment and/or continuous assessment and examination (open or closed book) as deemed appropriate. Where both methods are used, the weighting of each in the overall subject grade will be clearly stated in the relevant subject description forms. Continuous assessment may include tests, assignments, case studies/mini-projects, project report and oral presentation, laboratory work and other forms of classroom participation etc.. In case of group activity, both the overall performance of the group as well as individual effort/contribution of each team member shall also be assessed.

Details of the alignment of teaching, learning and assessment methods with programme aims and intended learning outcomes are shown in Section 4.4 and the individual subject syllabus/description form.

4. PROGRAMME STRUCTURE

Under the University credit-based system, all academic programmes fit in a common framework in which subjects of standard size (3 credits) are used as far as possible, except the Industrial-based Project option (6 credits) or Dissertation option (9 credits). The general structure, subjects offered and normal study pattern in full-time (FT) mode are detailed in this section.

4.1 General Structure

For this programme, the students have to complete a total of 33 credits.

4.1.1 All students enrolled in the programme should satisfy the minimum entrance requirements. Students satisfactorily completing a set of Core and Elective Subjects, Integrative Project and Industrial-based Project/Dissertation option (total 33 credits) in accordance with the given regulations will be eligible for the award of a Master of Science (MSc) degree in Automotive Engineering Design (AED).

4.1.2 The subjects will normally be run in the daytime and/or weekday evenings over a 13-week period, while some subjects may be run on weekends.

4.2 Full-time (FT) Study Load

Considering the diversified backgrounds of students studying this programme, the nature of elective subjects (i.e., engineering-based, EB and/or design-based, DB subjects) is suggested to guide them to develop their study profiles based upon their interests and career aspiration. The following table shows the detailed curriculum of the programme:

Non-dissertation option	Dissertation option
Core Subjects (3 credits for each core subject except ME5108; Total 24 credits)*: EE540 Vehicle Electrical and Mechanical Systems SD5800 Fundamentals of Car Design SD5802 Design and Culture: New Product Development ME5101 Project Development and Manufacturing ME5102 Car Body Structures and Aerodynamics ME5103 Integrative Project ME5108 Industrial-based Project (6 credits) **Elective Subjects (Any 3 subjects, 3 credits for each elective subject; Total 9 credits)*:** EE541 Advanced Electrical and Electronic Systems (EB) EE542 Car Mechatronics (EB) EE543 Hybrid and Electric Car Technology (EB & DB) ISE5011 Project Management in Auto Industry (EB & DB) SD5801 Ergonomics, Anthropometrics and Organisation (DB) ME5019 Safety and Reliability in Car Design (DB) ME5104 Advanced Vehicle Materials Technology (EB & DB) ME5105 Concurrent Engineering & Computer-Aided Technology (EB & DB) ME5106 Green Automotive Engine Technology (EB) ME5107 Noise, Vibration and Harshness in Automobile Design (EB)	**Core Subjects (3 credits for each subject; Total 18 credits)*:** EE540 Vehicle Electrical and Mechanical Systems SD5800 Fundamentals of Car Design SD5802 Design and Culture: New Product Development ME5101 Project Development and Manufacturing ME5102 Car Body Structures and Aerodynamics ME5103 Integrative Project **Elective Subjects (Any 2 subjects, 3 credits for each elective subject; Total 6 credits)*:** EE541 Advanced Electrical and Electronic Systems (EB) EE542 Car Mechatronics (EB) EE543 Hybrid and Electric Car Technology (EB & DB) ISE5011 Project Management in Auto Industry (EB & DB) SD5801 Ergonomics, Anthropometrics and Organisation (DB) ME5019 Safety and Reliability in Car Design (DB) ME5104 Advanced Vehicle Materials Technology (EB & DB) ME5105 Concurrent Engineering & Computer-Aided Technology (EB & DB) ME5106 Green Automotive Engine Technology (EB) ME5107 Noise, Vibration and Harshness in Automobile Design (EB) **Dissertation (9 credits)** ME592 Dissertation (9 credits)

**** Subject registration is subject to the availability of quota. The respective Departments reserve the right to change the elective subject(s) to be offered. The offer of elective subjects is subject to University regulations and availability of resources.***

4.3 Normal Study Pattern for Full-time Mode

This section outlines the normal study pattern for full-time mode of study for this programme. Students must follow closely this suggested study pattern and satisfy the requirements of subjects and projects/dissertation if they intend to complete their programme on time.

Full-time mode

Non-Dissertation Option#	**Dissertation Option^**
Year One- Semester 1 EE 540 Vehicle Electrical and Mechanical Systems SD5800 Fundamentals of Car Design SD5802 Design and Culture: New Product Development ME5101 Project Development and Manufacturing ME5102 Car Body Structures and Aerodynamics ME5103 Integrative Project@ **Year One- Semester 2** ME5103 Integrative Project@ ME5108 Industrial-based Project# Elective Subject I Elective Subject II Elective Subject III **Year One- Summer Term** ME5108 Industrial-based Project#	**Year One- Semester 1** EE 540 Vehicle Electrical and Mechanical Systems SD5800 Fundamentals of Car Design SD5802 Design and Culture: New Product Development ME5101 Project Development and Manufacturing ME5102 Car Body Structures and Aerodynamics ME5103 Integrative Project@ If students intend to register for the Dissertation (ME592) in Year One-Semester 1, they must receive endorsement and approval timely from their Academic Supervisors and ME Department. **Year One- Semester 2** ME5103 Integrative Project@ ME592 Dissertation^ Elective Subject I Elective Subject II **Year Two-Semester 1** ME592 Dissertation^ **Year Two-Semester 2** ME592 Dissertation^

@ *Integrative project (ME5103) will be carried out in two continuous semesters (Year 1- Semesters 1 & 2) and the final grade will be given at the end of Year 1- Semester 2.*

Industrial-based project (ME5108) option will normally be carried out in two continuous semesters (Year 1- Semester 2 and Summer Term) and the final grade will normally be given at the end of Year 1- Summer Term.

^ *Dissertation (ME592) option will normally be carried out in at least 3 regular semesters (i.e., Year 1- Semester 2 to Year 2- Semester 2) and the final grade will normally be given at the end of Year 2- Summer term. The registration period for the dissertation should be set at a maximum of 4 semesters from the date of registration, to align with the regulation of the Postgraduate Programme Scheme of the Faculty of Engineering.*

4.4 Curriculum Mapping

This is a conversion programme which aims at admitting students from a wide range of backgrounds and providing students with advanced knowledge and state-of-the-art technology to prepare then to work in the automotive engineering and design industry, particularly in car engineering design.

The relationship between the Subjects/Projects/Dissertation and Programme Aims is given as follows:

		Programme Aims			
		(a)	(b)	(c)	(d)
Core Subjects/Projects/Dissertation					
EE540	Vehicle Electrical and Mechanical Systems	√			
SD5800	Fundamentals of Car Design	√	√		
SD5802	Design and Culture: New Product Development		√		√
ME5101	Project Development and Manufacturing				√
ME5102	Car Body Structures and Aerodynamics	√	√		
ME5103	Integrative Project	√	√	√	
ME5108	Industrial-based Project	√	√	√	√
ME592	Dissertation	√	√	√	√
Elective Subjects					
EE541	Advanced Electrical and Electronic Systems	√			
EE542	Car Mechatronics	√			
EE543	Hybrid and Electric Car Technology	√	√		
ISE5011	Project Management in Auto Industry				√
SD5801	Ergonomics, Anthropometrics and Organization		√		√
ME5019	Safety and Reliability in Car Design	√		√	√
ME5104	Advanced Vehicle Materials Technology	√			
ME5105	Concurrent Engineering & Computer-aided Technology		√	√	√
ME5106	Green Automotive Engine Technology	√			√
ME5107	Noise, Vibration and Harshness in Automobile Design	√			

The relationship between Subjects/Projects/Dissertation between Programme Intended Learning Outcomes is given as follows:

		Programme Intended Learning Outcomes		
		(a) Professional competence	(b) Critical & creative thinking	(c) Lifelong learning capacity
Core Subjects/Projects/Dissertation				
EE540	Vehicle Electrical and Mechanical Systems	√	√	√
SD5800	Fundamentals of Car Design	√	√	√
SD5802	Design and Culture: New Product Development	√	√	√
ME5101	Project Development and Manufacturing	√	√	√
ME5102	Car Body Structures and Aerodynamics	√	√	√
ME5103	Integrative Project	√	√	√
ME5108	Industrial-based Project	√	√	√
ME592	Dissertation	√	√	√
Elective Subjects				
EE541	Advanced Electrical and Electronic Systems	√	√	√
EE542	Car Mechatronics	√	√	√
EE543	Hybrid and Electric Car Technology	√	√	√
ISE5011	Project Management in Auto Industry	√	√	√
SD5801	Ergonomics, Anthropometrics and Organization	√	√	√
ME5019	Safety and Reliability in Car Design	√	√	√
ME5104	Advanced Vehicle Materials Technology	√	√	√
ME5105	Concurrent Engineering & Computer-aided Technology	√	√	√
ME5106	Green Automotive Engine Technology	√	√	√
ME5107	Noise, Vibration and Harshness in Automobile Design	√	√	√

5. PROGRAMME REGULATIONS

The admission, registration and assessment arrangements described below are in accordance with the University policies and regulations for credit-based programmes which lead to an award of the University.

5.1 Pre-requisites, Recommended Background Knowledge, Exclusions, Mutual Exclusions and Exemptions without Credits

5.1.1 Certain subjects/project can be specified as "pre-requisites" for a particular subject, in which case the subject titles and code numbers of the pre-requisites will be specified in the subject description form. Students would not be allowed to take that subject

unless they have completed and passed the pre-requisite subjects, or unless they have obtained express approval from the subject lecturer and Department of Mechanical Engineering.

5.1.2 "Recommended background knowledge" may be stipulated in the subject description form of a subject and students who do not possess the recommended background knowledge should be counselled not to take the subject. However, they should not be barred from taking a subject simply on the ground that they do not have the recommended background knowledge. It is the students' responsibility to judge whether they have adequate background knowledge before registering on any subject.

5.1.3 A student's previous education experience may preclude his enrolment in certain elective subjects (i.e. he/she will not be allowed to take those subjects) if it was in a similar field and at a similar level, such that taking that subject will give them an unfair advantage over other students. Such exclusion is most likely to occur in some subjects provided within conversion or other postgraduate programmes. It will be necessary for the student to take another subject in order to satisfy the credit requirement for the award. Another example that a student may be excluded from a subject is when the subject is specially designed for those with a specific professional qualification.

5.1.4 If a subject from which a student is excluded is a core subject for the award in question then the student is considered to be exempted from that subject. The credits associated with the exempted subject will not be counted towards the credit requirement for the award. An exemption fee will be charged. This exemption will be without credits.

5.1.5 Students wishing to be exempted from any core subject must apply in writing to the subject offering Department via the Department of Mechanical Engineering providing evidence of previous study equivalent to the subject(s) from which exemption is claimed.

5.1.6 If there is a large degree of overlap between two subjects, the two may be mutually exclusive (i.e. a student who has passed one of the subjects will not be allowed to take the other). This must be specified in the subject description forms of both subjects.

5.2 Credit Transfer

5.2.1 At the discretion of the subject offering Department and on the recommendation of the respective subject lecturer and Department of Mechanical Engineering, students admitted to this programme may be given credit for previous relevant postgraduate study. A fee will be charged for credits successfully transferred.

5.2.2 The grades achieved in subjects taken as part of a PolyU postgraduate award for which credit transfer is approved may contribute towards the students' Grade Point Average (GPA). Grades achieved for postgraduate study which was not part of a PolyU programme will not contribute towards the students' GPA (credit transfer without the grade carried). The credits transferred will count towards the credit requirement for the award. All credit transfers approved will take effect only in the semester for which they are approved. A student who applies for transfer of credits during the re-enrolment or add/drop period for a particular semester will only be

eligible for graduation at the end of that semester, even if the granting of the credit transfer will immediately enable the student to satisfy the total credit requirement for the award.

5.2.3 The validity period of subjects earned is eight years from the year of attainment, i.e. the year in which the subject is completed, unless otherwise specified by the department responsible for the content of the subject. Credits earned from previous study should remain valid at the time when the student applies for transfer of credits. For exceptional cases such as those stated in 4.4.3(i) and 4.4.3(ii) below, subject offering departments shall have the discretion to approve the transfer of credits which have exceeded the validity period of subject credits on a case-by-case basis. All such exceptional cases must be reported to the Faculty Board with full justification.

(i) Mature learners for whom their previous studies were mostly completed a long time before their admission to PolyU, but who have working experience which would have kept them actively involved in the relevant area of study. The flexibility to be granted to these students based on academic comparability of subjects is in line with the policy of the University in promoting life-long learning.

(ii) Students for whom the expiry of validity of credits is beyond their control such as medical reasons.

5.2.4 If a particular stage of studies of a student is waived on the basis of advanced qualifications held at the time of admission, the student concerned will be required to complete fewer credits for award.

5.2.5 Credit transfer will be allowed for a maximum of 50% of an award if credits are earned outside PolyU and a maximum of 67% of an award if credits are earned from within PolyU.

5.2.6 In the cases where both types of credits are transferred (i.e. from programmes within the University and from approved institutions outside the University), not more than 50% of the normal credit requirement for the academic award may be transferred.

5.3 Registration/Progression/Academic Probation/Deregistration

5.3.1 The maximum period of registration is Four Years from the date of first registration for full-time study mode. However, overseas/mainland China students who are holding a student visa should be aware of the minimum subject & credit requirements. If a student is approved for deferring his/her study (see Section 5.4.1), the deferment period will not be counted towards the period of registration. No extension of registration period will be granted on grounds of timetable conflict or non-availability of subjects.

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

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

When a student has a Grade Point Average (GPA) lower than 2.0 (See Section 5.12), he will be put on academic probation in the following semester. If the student is able to pull his/her GPA up to 2.0 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in the transcript of studies.

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

(i) the student has exceeded the maximum period of registration for that programme as specified in the Definitive Programme Document; or
(ii) the student's GPA is lower than 2.0 for two consecutive semesters and his/her Semester GPA in the second semester is also lower than 2.0; or
(iii) the student's GPA is lower than 2.0 for three consecutive semesters.

The progression of students to the following academic year will not be affected by the GPA obtained in the Summer Term, unless Summer Term study is mandatory for all students of the programme and constitutes a requirement for graduation, and is so specified in the Definite Programme Document.

A student may be deregistered from the programme enrolled before the time frame specified in the above conditions (ii) or (iii) if his/her academic performance is unsatisfactory to the extent that the Board of Examiners considers that there is not much of a chance for him/her to attain a GPA of 2.0 at the end of the programme.

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

Under the current procedures, a student can appeal against the decisions of Boards of Examiners to deregister him/her. If such an appeal is upheld by the Department/School concerned, the recommendation (to reverse the previous decision to deregister the student) should also be presented to the relevant Faculty/School Board for final decision.

5.4 Deferment and Zero Subject Enrolment

5.4.1 A student may be allowed to interrupt his/her studies for a certain amount of time. This can be done by seeking either "deferment of study" or "zero subject enrolment". Both applications will have to be approved by the Department of Mechanical Engineering. Zero subject enrolment will only be considered for one semester at a time. Prior approval must be obtained. All semesters in which the students are allowed to take zero subjects will be counted towards the maximum period of registration. A fee for retention of study place will be charged. In order to gain approval for deferment of study, the student will have to provide strong justifications for deferring his/her studies for one semester or longer. Deferment will normally be granted for no more than 2 semesters at a time. The total period of deferment cannot exceed 4 semesters. The deferment period will not be counted towards the maximum period of registration.

5.4.2 Students must apply to the Department of Mechanical Engineering for not taking any subjects in a semester. Otherwise they will be classified as having unofficially withdrawn from their study. Applications should be submitted before the commencement of the semester concerned or in exceptional circumstances before the end of the add/drop period. All semesters in which the students are allowed to take zero subjects will be counted towards the maximum period of registration. A fee for retention of study place will be charged.

5.5 Subject Registration/Adding and Dropping of Subjects/Withdrawal of Subjects

5.5.1 Subject registration will be carried out prior to the commencement of each semester.

5.5.2 Students may normally ADD new subject(s) and DROP registered subject(s) during the two-week add/drop period which will end two weeks after the commencement of the semester for both Semesters One and Two. A one-week add/drop period at the start of the Summer Term will also be provided. Students officially dropping a subject during the add/drop period will be considered not to have registered for the subject. Students are not allowed to drop subjects after the add/drop period.

5.5.3 If students have a genuine need to drop a taught subject (including integrative and industrial-based projects) after the add/drop period, they may apply in writing to the Department of Mechanical Engineering. The application will require the approval of both the Subject Lecturer/Academic Supervisor (for industrial-based project) and the Department of Mechanical Engineering concerned. Applications submitted after the commencement of the examination period will not be considered. For approved applications, the tuition fee paid for the subject will be forfeited and the WITHDRAWAL status of the subject/project will be shown in the examination result notification and transcript of studies but will not be counted towards the calculation of GPA.

5.6 Assessment of Taught Subjects and Industrial-based Project

The assessment regulations adopted by the programme conform to the University's General Assessment Regulations for credit-based programmes. The ultimate authority in the University for the confirmation of academic decisions is the Senate, but for practical reasons, Senate has delegated to the Faculty Boards the authority to confirm the decisions of Boards of Examiners provided these are made within the framework of the General Assessment Regulations. Recommendations from Board of Examiners which fall outside these Regulations shall be ratified by the Academic Regulations Committee and reported to Senate.

5.6.1 A variety of assessment methods will be used. This may include essays, seminar papers, presentations, projects, case studies, laboratory work, class tests, other forms of classroom participation and work done individually or in groups etc. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately.

5.6.2 The assessment for a subject is based on one or two components, namely coursework and/or examination. The weighting of coursework and examination is shown in the individual subject description forms.

5.6.3 An assessment panel for an Industrial-based Project led by the Project Coordinator and/or Programme Leader will be set up to examine their project progress, formal written report, and oral presentation. The weighting of project progress, formal written report and oral presentation is shown in the subject description form.

5.7 Assessment of Dissertation

5.7.1 Students are expected to submit a dissertation proposal with the endorsement from their respective academic supervisor(s) to the Dissertation Coordinator (DC)/Departmental Postgraduate Programme Committee (DPPC) of the Department of Mechanical Engineering no later than the last teaching day of the semester in which s/he first registers for dissertation. If full-time students intend to register for the dissertation in the first semester of their Year-One study, they should consult their Academic Supervisors for the proper procedures and seek endorsement and approval timely from their Academic Supervisors and the DC/DPPC.

5.7.2 Students can register for dissertations only if they are co-taking and/or have taken a total of 3 taught subjects (including credit transferred subjects) in that semester. Students will be required to complete their dissertations within the normal period of 3 semesters. Those who are not able to complete their dissertation may seek for the advice of the Academic Supervisors, and apply for approval from the DC/DPPC to extend the dissertation registration beyond the normal period but within the maximum period of 4 semesters. Applications for extension beyond the normal period will be considered by the Department of Mechanical Engineering, and approval will only be granted under exceptional circumstances.

5.7.3 When permission is granted to extend the dissertation registration beyond the normal period, the student will be required to pay a 3-credit tuition fee for each additional semester.

5.7.4 Break of study is normally not permitted once a student registers for dissertation and students are expected to pursue their dissertation in consecutive semesters.

5.7.5 An assessment panel for a Dissertation will be set up to examine his/her dissertation progress, formal written dissertation, and oral presentation. The weighting of dissertation progress, formal written dissertation and oral presentation is shown in the subject description form.

5.7.6 A copy of the dissertation should be sent to each of the supervisors and assessors and one copy should be kept by the student.

5.7.7 After submission of the formal written report, the academic supervisor should make arrangements with the assistance of the department on a mutually convenient time and place for an oral examination at which the other assessors will be present. The date set for the oral examination should allow sufficient time for the examiners to read through the submission and should normally be no later than one month after submission of the dissertation.

5.7.8 After conducting the oral examination, the assessment examination panel will jointly allocate a grade guided by the weightings which may vary depending on the nature of the project. The assessment weightings are detailed in the description form of Dissertation (ME592).

5.7.9 After the assessment of the dissertation is complete, the academic supervisor will write a report on the outcome using standard outline report forms. These reports must be signed by all assessors who participated in the assessment of the dissertation and be submitted to the DC/DPPC.

5.7.10 The report will contain a date by which the students should submit their final dissertation to the Department which would arrange to send the bound copies to the Library. The deadline for submission of the examination report to the DC/DPPC is TWO WEEKS before the meeting of the Subject Assessment Review Panel (SARP).

5.7.11 Department can at its discretion allow students to complete their dissertations during the period between May and late June by conducting the assessment then. In such cases these results could be processed by the Subject Assessment Review Panel held in the middle of July to allow students to graduate in the following October/November.

5.7.12 Students whose dissertations are deemed satisfactory by the academic supervisor(s) and assessors but who fail to achieve the minimum acceptable grade (i) overall; or (ii) for the oral examination; or (iii) the report, may be allowed to be re-examined within a time limit set by the Subject Assessment Review Panel/Board of Examiners.

5.7.13 Students failing their dissertations will not be allowed to re-take their dissertation subjects.

5.7.14 A set of operational guidelines on dissertation will be provided for students who opt for dissertation.

5.8 Assessment Grades

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

Subject grade	***Short description***	***Elaboration on subject grading description***	***Grade point***
A+	Exceptionally Outstanding	The student's work is exceptionally outstanding. It exceeds the intended subject learning outcomes in all regards.	4.5
A	Outstanding	The student's work is outstanding. It exceeds the intended subject learning outcomes in nearly all regards.	4
B+	Very Good	The student's work is very good. It exceeds the intended subject learning outcomes in most regards.	3.5
B	Good	The student's work is good. It exceeds the intended subject learning outcomes in some regards.	3
C+	Wholly Satisfactory	The student's work is wholly satisfactory. It fully meets the intended subject learning outcomes.	2.5
C	Satisfactory	The student's work is satisfactory. It largely meets the intended subject learning outcomes.	2
D+	Barely Satisfactory	The student's work is barely satisfactory. It marginally meets the intended subject learning outcomes.	1.5
D	Barely Adequate	The student's work is barely adequate. It meets the intended subject learning outcomes only in some regards.	1
F	Inadequate	The student's work is inadequate. It fails to meet many of the intended subject learning outcomes.	0

5.8.2 "F" is a subject failure grade and all others ("D" to "A+") are subject pass grades.

5.8.3 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. For example, at the discretion of the Subject Lecturer/Subject Assessment Review Panel, a student failing badly in one component of the subject might be given an "F" grade.

5.9 Retaking of Subjects

5.9.1 Students may retake any subject for the purpose of improving their grade without having to seek approval, but they must retake a core subject/project which they have failed, i.e. obtained an F grade. Retaking of subjects/projects 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 core subject/project) and can only do so if places are available.

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

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

5.10 Exceptional Circumstances

5.10.1 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/her control, and considered by the Subject Assessment Review Panel (SARP) as legitimate, the Panel will determine whether the student will have to complete the assessment and, if so, by what means. This late assessment shall take place at the earliest opportunity, and before the commencement of the following academic year (except that for Summer Term, which may take place within 3 weeks after the finalisation of Summer Term results). If the late assessment cannot be completed before the commencement of the following academic year, the Faculty/School Board Chairman shall decide on an appropriate time for completion of the late assessment.

The student concerned is required to submit his/her application for late assessment in writing to the Head of Department offering the subject, within five working days from the date of the examination, together with 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.

5.11 Eligibility for Award

5.11.1 To be eligible for the award of a Master of Science (MSc) Degree in Automotive Engineering Design, students need to successfully complete 33 credits. The requirements are as follows:

For taking Industrial-based Project option:
(i) 7 Core Subjects/Projects (24 credits); and
(ii) 3 Elective Subjects (9 credits).

For taking Dissertation option:
(i) 6 Core Subjects/Project (18 credits);
(ii) 2 Elective Subjects (6 credits); and
(iii) Dissertation (9 credits)

5.11.2 Students must satisfy the residential requirement for at least one-third of the credits required for the award to be completed under the current enrolment at PolyU, unless professional bodies stipulate the otherwise.

5.11.3 The student's final Grade Point Average (GPA) must be 2.0 or above.

5.11.4 The awards of Master's degree are classified as: Distinction, Credit, and Pass.

5.11.5 A student is required to graduate as soon as he/she satisfies all the conditions for the award (see Section 5.11.1). He/She may be allowed to take more taught subjects than required to graduate in or before the semester within which he/she becomes eligible for award. Subject to the maximum study load of 21 credits per semester and availability of places, a student may take elective subjects of up to a maximum of 9 credits on top of the prescribed credit requirements for award, in or prior to the final semester before graduation.

5.12 Grade Point Average (GPA)

5.12.1 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:

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

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

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

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

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

5.12.2 For the purpose of determining the award classification, any subjects passed after the graduation requirement has been met or subjects taken on top of the prescribed credit requirements for award shall not be taken into account in the grade point calculation for award classification. However, if a student attempts more elective subjects (or

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

5.12.3 All taught subjects offered within the programme contribute equally to the calculation of the GPA.

5.13 Guidelines for Award Classification

The following GUIDELINES will be used by the Board of Examiners to recommend the classification of the award:

Guidelines

Distinction The student's performance/attainment is outstanding, and identifies him as exceptionally able in the field covered by the programme in question.

Credit The student has reached a standard of performance/attainment which is more than satisfactory but less than outstanding.

Pass The student has reached a standard of performance/attainment ranging from just adequate to satisfactory.

5.14 Graduation

5.14.1 A student should be granted a Master's award without having to submit an application for graduation if he/she has fulfilled all the requirements for a Master's award.

5.14.2 Condition 5.14.1 applies only when the student has a valid registration status. If a student's registration status has been set to "Study ended" due to non-compliance with PolyU regulations, for example, failure to pay fees, he/she will not be eligible for the award unless his/her registration status has been reinstated.

5.14.3 Students who have committed academic dishonesty will be subject to the penalty of the lowering of award classification by one level. The minimum of downgraded overall result will be kept at a Pass.

5.15 Recording of Disciplinary Actions in Students' Records

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

5.15.2 Students who are found guilty of academic dishonesty will be subject to the penalty of having the subject result concerned disqualified and be given a failure grade with a remark denoting 'Disqualification of result due to academic dishonesty'. The remark will be shown in the students' record as well as the assessment result notification and transcript of studies, until their leaving the University.

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

PART B SYLLABUSES

Core Subjects/Projects/Dissertation

Subject Description Form

Subject Code	EE540
Subject Title	Vehicle Electrical and Mechanical Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in electric circuit analysis, electronic devices and thermofluids.
Objectives	1. To enable students to understand the operation principles of various types of car engines; 2. To provide students with in-depth knowledge in other automotive mechanical systems; 3. To provide students with a comprehensive understanding of electrical distributions in typical vehicles; 4. To enable students to understand the operation principles of various electromechanical systems of vehicles; and 5. To enable students to acquire knowledge in vehicle related accessories.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand concepts of basic electrical and mechanical systems in typical vehicles; b. Explain principles of operations of typical vehicular electrical and mechanical systems; and c. Compare different ways of implementation of some typical vehicular electrical and mechanical systems.
Subject Synopsis/ Indicative Syllabus	***Electrical Distributions in Typical Vehicle:*** Typical electrical distribution systems in cars and trunks. Wiring topology. Power bus topology. ***Electrical Power Sources:*** Batteries. Alternators. AC & DC charging systems. Electro-mechanical & power electronic regulators. Integrated starter alternators (ISA). Introduction to concept of hybrid/electric vehicles. ***Electro-mechanical Devices:*** Ignition systems. Cranking systems. Power windows. Screen/headlamp wipers/washer. Power doors & roofs. Power mirrors. Car lighting systems. ***Electronic Systems and Accessories:*** Basic electronic control systems. Dashboard instrumentation and signalling circuits. Intelligent systems in cars. Introduction of driverless cars. ***Engines:*** Types of engine. Basic engine cycles. Engine performance. ***Transmission and Driveline:*** Clutch. Gear box. Automatic transmission. Continuously variable transmission. Matching between engine and gearbox.

	Braking Systems: Braking system and components. Legal requirements of braking system. Fundamentals of braking. ***Air-conditioning Systems:*** Air-conditioning systems in cars.
Teaching/Learning Methodology	Lectures and tutorials are effective teaching methods: 1. To provide an overview or outline of the subject contents; 2. To introduce new concepts and knowledge to the students; 3. To explain difficult ideas and concepts of the subject; and 4. To allow students to feedback on aspects related to their learning. Mini-project works/assignments/presentations are essential ingredients of this subject: 1. To supplement the lecturing materials; 2. To add real experience for the students; 3. To provide deeper understanding of the subject; and 4. To enable students to organize principles and challenge ideas. Seminars from industrial experts may also be arranged, this will give student up-to-date status of the development in alternative energy area, as well as market trends.

Teaching/Learning Methodology	Intended learning outcomes		
	a	b	c
1. Lectures	√	√	
2. Tutorials	√	√	√
3. Case studies			√
3. Mini-project/Assignments/Presentations			√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	c	d
1. Class tests	20	√	√	√
2. Mini-project/ Assignments/ Presentation	20		√	√
3. Examination	60	√	√	√
Total	100			

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The understanding on theoretical principles and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests, assignments, mini-project report and

	presentations are an integrated approach to validly assess students' performance with respect to the intended subject learning outcomes.	
Student Study Effort Required	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Case study/Seminar	9 Hrs.
	Other student study effort:	
	▪ Self study	42 Hrs.
	▪ Mini-project/Assignments	21 Hrs.
	Total student study effort	102 Hrs.
Reading List and References	1. Genta G., Morello L., Cavallino F. and Filtri L., *The Motor Car* [electronic resource]: *Past, Present and Future*, Springer, latest edition. 2. Halderman J.D., *Automotive Electricity and Electronics*, Upper Saddle River, N.J., Pearson/Prentice Hall, latest edition. 3. Candela, T., *Automotive Wiring and Electrical Systems*, CarTech, latest edition. 4. Emadi A., *Advanced Electric Drive Vehicles* [electronic resource], CRC Press, latest edition. 5. Stone R., *Introduction to Internal Combustion Engine*, Palgrave Macmillan, latest edition. 6. Sun Z., *Design and Control of Automotive Propulsion Systems* [electronic resource], CRC Press, latest edition. 7. Yang S., Chen L. and Li S., *Dynamics of Vehicle Road Coupled System* [electronic resource], Springer, latest edition.	

Subject Description Form

Subject Code	SD5800
Subject Title	Fundamentals of Car Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge of product design and engineering.
Objectives	To provide students with the basics concept of car design, through theoretical and technological approaches.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Generate vehicle design concepts; b. Understand the automotive structure and systems; c. Understand the latest automotive design and engineering developments; and d. Understand what and how automotive designers think and work.
Subject Synopsis/ Indicative Syllabus	***Legislations:*** Understanding varies governing legislative requirements worldwide in car design. ***Manufacturing:*** Understanding current and future manufacturing methodologies, and materials used within the automotive industry. ***Vehicle Safety:*** Understand the increasing importance of vehicle safety when designing vehicles. ***Vehicle Technology:*** Knowledge of history of vehicle design. State-of-the-art technologies and future trends in vehicle technology development. ***Vehicle design concepts:*** Understanding good vehicle design concept: a balance between style and fashion. ***Sketching:*** Learning the basics of sketching ideas.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, tutorials, homeworks, in-class work & presentations, group work and final test etc.

2. The continuous assessment is aimed at providing students with integrated knowledge required for fundamentals of car design.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures (plain & interactive)		√	√	√
2. Tutorials		√	√	√
3. Homework (individual & group)	√	√		√
4. In-class work & presentations	√	√		√

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. Class participation	30		√		√
2. Sketching Skills	30	√	√	√	√
3. Final Test	40		√	√	√
Total	100				

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

1. The assessment will comprise 100% continuous assessment.

2. The continuous assessment will consist of three components: class participation, sketching skills and final test. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

Student Study Effort Expected

Class contact:	
▪ Lecture	21 Hrs.
▪ Tutorial	24 Hrs.
Other student study effort:	
▪ sketching	21 Hrs.
▪ self study	39 Hrs.
Total student study effort	105 Hrs.

Reading List and References	1. Lee Tak, *Designing Automobiles: from strategic planning to integrated product development*, Strategic Design Lab, School of Design, The Hong Kong Polytechnic University, latest edition. 2. Heisler H., *Advanced Vehicle Technology*, Oxford: Butterworth-Heinemann, latest edition. 3. Erjavec Jack, A*utomotive Technology: A Systems Approach*, Clifton Park, N.Y.: Thomson/Delmar Learning, latest edition. 4. Peters G.A., *Automotive Vehicle Safety*, London; New York: Taylor & Francis, latest edition. 5. *Body Structures, Materials and Structural Engineering: Today's choice for our future cars*, Chassis Engineering, Epsom: ISATA – Dusseldorf Trade Fair, latest edition. 6. European Union Law: Official Journal. Website: http://eur-lex.europa.eu/en/index.htm. 7. Ministry of Land, Infrastructure and Transport, Japan. Website: http://www.mlit.go.jp/english . 8. Act and Regulations, Transport Canada, Canada. Website: http://www.te.gc.ca/acts_regulations/menu.htm . 9. Department of Transportation, USA. Website: http://www.dot.gov . 10. Frank Costin - Flying on Four Wheels, Dennis E. Ortenburger, Patrick Stephens Limited, Wellingborough, UK, latest edition. 11. Racing and Sports Car Chassis Design, Michael Costin and David Phipps, B.T. Batsford Ltd, London, UK, latest edition. 12. Sex, Drink and fast Cars – The creation and consumptions of Images, Stephen Bayley, Faber & Faber, London, latest edition. Journals/Technical Magazine 1. SAE Technical Paper, Society of Automotive Engineers International, USA. 2. IMechE Technical Paper: Journal of Automobile Engineering, Institution of Mechanical Engineers, UK. 3. Car Styling Magazine, Japan. 4. Automotive Engineering International, Chinese edition. A SAE International Publication in Cooperation with Ringier Trade Media Ltd. 5. Automotive Manufacturing and Design for China, Chinese edition, Ringier Trade Media Publication.

Subject Description Form

Subject Code	SD5802
Subject Title	Design and Culture: New Product Development
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	A process (CPI: Cultural Product Initiatives) for cultural based innovation is developed on top of the iNPD (Integrated New Product Development) process developed by Vogel and Cagan at Carnegie Mellon University provides the basis of this subject. The goal of this workshop is to learn this process and supporting tools of the process, to understand the rationale behind, and to be able to apply the process creatively.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to have the following professional skills: a. Apply CPI and the iNPD process; and b. Be proficient with tools including SETIG Factor Analysis, Impact Analysis (Value Opportunity Analysis), Cultural Product Positioning Matrix, etc. c. Act creatively by critically analyzing the user, the business environment, culture, the technical and legislative environment in the context of design, and d. Produce solid arguments through research and effective visual, written and oral communication; and e. Engage in and lead collective decision making.
Subject Synopsis/ Indicative Syllabus	***What Drives Cultural Product Development:*** Cultural Products – Products that reflect unique visual, structural, functional, behavioral cultural background, fulfill unique cultural needs of users, or both. SETIG Factors Analysis ***A Comprehensive Approach to Culturally Based Innovation:*** Cultural Product Initiatives (CPI) – A four-phase integrated process that begins with identifying cultural product opportunity and ends with cultural insights that can be used as criteria for generating cultural product concepts. Cultural Product Positioning Matrix - Positioning of a product based on how it reflects unique visual, structural, functional or behavioral background of a culture. ***Integrated New Product Development (iNPD):*** A four-phase integrated process that begins with identifying product opportunity and ends with the realization of a well-developed product concept.

Teaching/Learning Methodology

1. A method for culturally based innovation will be introduced through a combination of lectures, presentations, and discussions. Students will work in teams to apply the methods through a hypothetical new product/service development exercise. Each team has to identify a culturally appropriate product opportunity for a specific targeted user group and to set up product goals and criteria.

2. The final deliverable will be an individual project refining the product opportunity identifies in the group project, identifying cultural references as inspiration for realizing the opportunity, and using Cultural Product Positioning Matrix to benchmark and evaluate the opportunity. A written report will be handed in as the deliverable for the individual project.

Teaching/Learning Methodology	Intended subject learning outcomes				
	a	b	c	d	e
1. Lectures (plain & interactive)	√		√		
2. Tutorials	√	√			
3. Homework (individual & group)	√	√	√	√	√
4. In-class group work & present.	√		√	√	√

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. Group project	30	√	√	√	√	√
2. Individual report	60	√	√	√	√	
3. Class participation	10			√	√	
Total	100					

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

1. The assessment will comprise 100% continuous assessment.

2. The final grade will be based on class participation, an individual written report and group presentation.

3. The report and presentation will be evaluated for both intellectual content (quality of argument, accuracy of representing the ideas discussed by authors, and imagination in developing ideas) and oral/written presentation (style, speech skill, engagement with audience, visual appearance). Adjustments will be made for those students whose native language is not English.

4. For the group presentation, collaboration among team members is very important. Usually members from the same group will have the same grade for group presentation. However, ineffective participation of group activities might affect individuals' grades on the presentations, which will be determined by peer assessment.

Student Study Effort Expected	Class contact:	
	▪ Lecture	21 Hrs.
	▪ Tutorial/Case study	12 Hrs.
	▪ Group discussions and presentations	6 Hrs.
	Other student study effort:	
	▪ Self study	38 Hrs.
	▪ Group project work	28 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Cagan J. and Vogel C.M., *Creating Breakthrough Products: Innovation from Product Planning to Program Approval,* Prentice Hall, NJ, latest edition. 2. Vogel C.M., Cagan J. and Boatwright P., *The Design of Things to Come: How Ordinary People Create Extraordinary Products*, Wharton School Publishing, latest edition. 3. Friedman T., *The Lexus and the Olive Tree*, Anchor Books, NY, latest edition. 4. Laurel B., *Design Research: Methods and Perspectives*, The MIT Press, latest edition. 5. Margolin V. and Buchanan R., T*he Idea of Design: a Design Issues Reader*, The MIT Press, latest edition. 6. Xin X.Y., *Constructing Culturally Based Innovation: A Formal Process for Creating Cultural Product based on Chinese Cultural Studies*, PhD Dissertation, Carnegie Mellon University, latest edition. 7. Nisbett R.E., *The Geography of Thought: How Asians and Westeners Think Differently, and Why*, Free Press, Simon & Schuster, NY, latest edition. 8. Hall E.T., *The Silent Language*, Anchor Books Doubleday, NY, latest edition. 9. Hall E.T., *The Hidden Dimension*, Anchor Books Doubleday, NY, latest edition. 10. von Oech R., Ph.D., *A Whack On The Side Of The Head: How to unlock your creative mind for innovation*, Warner Books, NY, latest edition.	

Subject Description Form

Subject Code	ME5101
Subject Title	Project Development and Manufacturing
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in materials science and engineering.
Objectives	1. To pick up the knowledge related to project development life cycle, especially for product life cycle management, eco-design of vehicles, the end of life of vehicles, supply chain techniques needed in project development life cycle; 2. To understand and appreciate the use and effects of rapid prototyping and manufacturing technology in car design; 3. To acquire knowledge of the rapid prototyping & manufacturing technology associated with the design and development of an automobile; and 4. To establish the ability to define, analyse, plan and apply the rapid prototyping and manufacturing technology in car design.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the project development life cycle and life cycle management in automotive design and development; b. Understand the rapid prototyping technology in automotive design and development; and c. Understand the contemporary manufacturing technologies and how they are used in automotive components production.
Subject Synopsis/ Indicative Syllabus	***Project Development Life Cycle:*** Introduction to project development life cycle and the related enabling technologies. Product lifecycle management techniques and systems. Supply chain techniques for project development. The basis of eco-design. The methods and principles of the end of life of vehicles. ***Need for Rapid Prototyping:*** Basic principles and advantages of RP. Classifications of RP techniques with examples. Introduction to three representative RP techniques: fused deposition modeling, laminated object manufacturing and stereo-lithography. ***Overview of Contemporary Rapid Prototyping Technology for Car Design:*** Formation of plastic, sheet metal and metal parts by additive, subtractive and formative fabrication by using rapid prototyping.

Introduction to Contemporary Manufacturing Technology Used in Automotive Industry: CNC machining and high speed machining, rapid tooling, metal forming and stamping, plastic moulding, electrical & chemical etching, metal casting, material welding and jointing, painting and coating processes.

Emerging Trends of Rapid Prototyping and Manufacturing Technology Associated with Car Design.

Case Studies of Rapid Prototyping and Manufacturing Technology in Automotive Application.

Teaching/Learning Methodology

1. The subject will be taught via lectures, tutorial, laboratory experiment and group project.

2. Lectures are used to deliver the fundamental knowledge in relation to project development life cycle, RP and manufacturing technology.

3. Tutorials are used to illustrate the applications of the fundamental knowledge to practical situation.

4. Experiments are used to relate the concepts to practical applications and students are exposed to hands-on experience, proper use of equipment and application of analytical skills on interpreting experimental results.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lectures	√	√	√
2. Tutorials	√	√	√
3. Experiments		√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignment	25	√	√	√
2. Study report	25	√	√	√
3. Group project	25		√	√
5. Experiment	25		√	√
Total	100			

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

1. The assessment will comprise 100% continuous assessment.

2. Assignment is used to enhance students' understanding of theory and fundamentals and assess them in terms of the understanding.

3. In addition, the study report, group project and experiment are also used to help students pick up the required knowledge and assess their study.

Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial/Visit	3 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Assignment	23 Hrs.
	▪ Study report	20 Hrs.
	• Group project	23 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Childs P.R.N. and Stobart R.K., *Total Vehicle Technology- Challenging Current Thinking*, Professional Engineering Publishing Ltd., UK, latest edition. 2. Braess H.H. and Seiffert U., *Handbook of Automotive Engineering*, SAE International, latest edition. 3. El-Hofy H., *Advanced Machining Processes: Non-traditional and Hybrid Machining Processes*, McGraw-Hill, latest edition. 4. Boljanovic V., *Sheet Metal Forming Process and Die Design*, Industrial Press, latest edition. 5. Gebhardt A., *Rapid Prototyping*, Hanser, latest edition. 6. Grimm T., *User's Guide to Rapid Prototyping*, Society of Manufacturing Engineers, latest edition. 7. Hopkinson N., Hague R.J.M. and Dickens P.M., *Rapid Manufacturing - An Industrial Revolution for the Digital Age*, John Wiley & Sons, latest edition. 8. Vinarcik E.J., *High Integrity Die Casting Processes*, John Wiley & Sons latest edition. 9. Kalpakjian S. and Schmid S.R., *Manufacturing Engineering and Technology*, Prentice Hall, latest edition. 10. Automotive Manufacturing and Design for China. Chinese edition, Ringier Trade Publication, latest edition.	

April 2014

Subject Description Form

Subject Code	ME5102
Subject Title	Car Body Structures and Aerodynamics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge on mathematics, engineering materials, and applied mechanics.
Objectives	This project aims to provide students with knowledge of fundamentals and principles of design and analysis on car body, chassis, suspension and steering systems.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the fundamentals and principia of car body structures, chassis, suspension and steering systems; b. Design basic car body structures using various methodologies; c. Analyze the car body structures, chassis, suspension and steering systems; and d. Understand the relationship between aerodynamic drag and car body geometry and design for drag optimization.
Subject Synopsis/ Indicative Syllabus	***Introduction to Car Body Structures:*** Car body. Chassis. Suspension and steering. ***Body Design:*** Fundamental vehicle loads and their estimation. Vehicle structure types. Simple structure surface (SSS) method. Standard sedan-baseline load paths. Body subassemblies and model variants. Structural surfaces and floor grillages. Vehicle structure preliminary design SSS method. CAE technology for body design. ***Chassis Design and Analysis*:** Load cases. Chassis types. Tyres and wheels. Structural analysis by simple structure surface method. CAE technology for chassis design. ***Suspension and Steering Systems*:** The role of a vehicle suspension. Factors affecting design. The mobility of suspension mechanisms. Suspension types. Kinematic analysis. Roll centre analysis and force analysis. Suspension components and controllable suspensions. Vehicle ride analysis. Steering system. Rack and pinion steering. Recirculating ball steering. Steering column and damper. Steering kinematics. CAE simulations of suspension and steering systems.

Car Body Aerodynamic Optimization: Computational aerodynamic analysis of car body using commercial software. Strategies for aerodynamic development and drag optimization. Front end modification. Front and rear wind shield angle. Boat tailing. Hatch back, fast back and square back. Dust flow patterns at the rear- effects of gap configuration and fasteners.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for car body structures and aerodynamics.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures	√	√	√	√
2. Tutorials	√	√	√	√
3. Homework assignments	√	√	√	√
4. Case study report and presentation	√	√	√	

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	20	√	√	√	√
2. Test	20	√	√		
3. Case study report and presentation	20	√	√	√	
4. Examination	40	√	√	√	√
Total	100				

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

1. The assessment will comprise 60% continuous assessment and 40% examination.

2. The continuous assessment will consist of three components: homework assignments, test, and case study report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

	3. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	27 Hrs.
	▪ Tutorial/Case study	8 Hrs.
	▪ Group discussions and presentations	4 Hrs.
	Other student study effort:	
	▪ Self Study	45 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Smith J.H., *An Introduction to Modern Vehicle Design*, Butterworth Heinemenn, latest edition. 2. Brown J.C., Robertson A.J. and Serpento S.T., *Motor Vehicle Structures-Concepts and Fundamentals*, Butterworth Heinemenn, latest edition. 3. Rao V. Dukkipati, Jian Pang, Mohamad S. Qatu, Gang Sheng Chen, Zuo Shuguang, *Road Vehicle Dynamics Problems and Solutions*, Society of Automotive Engineers International, latest edition. 4. Reimpell J. and Stoll H., *The Automotive Chassis: Engineering Principles*, Society of Automotive Engineers International, latest edition. 5. Hucho W.H., *Aerodynamics of Road Vehicles*, Butterworths Co. Ltd, latest edition. 6. Katz, J., *Race Car Aerodynamics: Designing for Speed* (*Engineering and Performance*), Bentley Publishers, latest edition. 7. Society of Automotive Engineers International, *Automotive Aerodynamics: Update*, latest edition. 8. Society of Automotive Engineers International, *Vehicle Aerodynamics*, latest edition.	

Subject Description Form

Subject Code	ME5103
Subject Title	Integrative Project
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Layout and various systems of a typical automobile.
Objectives	To provide students with a holistic understanding on various automobile engineering systems, including the chassis, power train and transmission, suspension and steering, braking through practical appreciation and participation in designing, developing and building up a concept car.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand automotive structures and sub-systems; b. Understand the working principles of the four stroke and two stroke engines; c. Understand the differences between the gasoline engine and diesel engine; super charged and turbo charged engines; d. Understand the pros and cons of front wheel drive and rear wheel drive system as well as the automatic and manual transmission; e. Design and develop an automobile from the body structure to electrical systems and air conditioning system; and f. Work practically on car design and manufacturing process.
Subject Synopsis/ Indicative Syllabus	Appreciation of the construction and design of major automobile components, as follows: 1. Chassis and body: including ladder type, integral and semi integral. 2. Engine and fuel: 4-stroke cycle engine, 2-stroke cycle engine, and Wankel engine; gasoline and diesel engines; traditional and electronic ignition, carburetor and fuel injection, normal, super charged, and turbo charged engines; 3. Power transmissions, front wheel drive, rear wheel drive, and all wheel drive; manual transmission, automatic transmission, and cvt transmission; 4. Braking, tire and wheel systems including various kinds of brakes and power assisted systems; 5. Steering systems, car's electrical ignition system, battery drive system, and lighting system, and air conditioning system; and 6. Suspension systems, coil spring, leaf spring, pneumatic, and hydraulic activated; various kinds of suspension linkage arrangement.

Teaching/Learning Methodology

1. The course is divided into three stages, with 30 hours of design appreciation and 30 hours of design and project planning in the first semester and winter break, and 60 hours of project work in the second semester.

2. During the design appreciation stage, students will gain practical experiences in the construction and design of major automobile components through planned dismantling and reassembling of a car including the engine, power train, braking system, steering system, and body panels.

3. In the second and third components of the course, students will work in groups to try out their innovative car design concept through making a small concept car. In the project, students will plan for themselves how to execute the project and deploy themselves to design and make an innovative mini automobile including car body styling and structure, power drive and control system, steering and braking system, etc., with each group of student focusing on one major part of the car.

4. Students will be asked to integrate what they have learnt in the classroom with the practical experience they gained at the beginning of this module, and to include as many new concepts and technologies as possible in the development of this mini automobile.

Teaching/Learning Methodology	Intended subject learning outcomes					
	a	b	c	d	e	f
1. Practical appreciation of automotive systems	√	√	√	√	√	
2. Automotive design and make	√		√	√	√	√

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	f
1. Individual written assignments	40	√	√	√	√	√	
2. Group project work	60	√		√	√	√	√
Total	100						

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

1. The assessment will comprise 100% continuous assessment.

2. The continuous assessment consists of a set of individual assignments and a group project, as follows:

   Individual Assignments: Each student is required to submit 4 assignments during the first phase of the course, with context relating to various systems of a car.

	Group Project: Students in group are required to design and produce a selected system of a concept car, with all groups working collaboratively towards making a concept car.	
Student Study Effort Expected	Class contact:	
	▪ Practical appreciation and lecturing	39 Hrs.
	▪ Group Project	78 Hrs.
	Other student study effort:	
	▪ Self study	33 Hrs.
	Total student study effort	150 Hrs.
Reading List and References	1. *Handbook of Automotive Engineering*, Society of Automotive Engineers International, latest edition. 2. Birch T.W., *Automatic Transmissions and Transaxles*, Prentice Hall, latest edition. 3. Dixon J.C., *Tires, Suspension, and Handling*, Society of Automotive Engineers International, latest edition. 4. Erjavec J., *Hybrid, Electric, and Fuel-Cell Vehicles*, Cengage Learning, latest edition. 5. Knowles D., *Automotive Suspension & Steering Systems*, Cengage Learning, latest edition. 6. Macey S., *H-Point: The Fundamentals of Car Design & Packaging*, Design Studio Press, latest edition. 7. Milliken W.F., Milliken D.L. and Olley M., *Chassis Design: Principles and Analysis*, Society of Automotive Engineers International, latest edition. 8. Sclar D., *Auto Repair for Dummies*, For Dummies, latest edition. 9. Walker J., *High-Performance Brake Systems*, CarTech Inc., latest edition.	

Subject Description Form

Subject Code	ME5108
Subject Title	Industrial-based Project
Credit Value	6
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Completion of the core subjects (EE540, ME5101, ME5102, SD5800 and SD5802) unless with special approval from the Department of ME.
Objectives	1. To provide students an opportunity of in-depth study of a particular topic in automotive engineering design, manufacture and/or management; and 2. To enhance the students ability in utilizing advanced design concept and analysis, engineering technology and management skill in solving real-life problems in the automotive engineering and design industry through an industrial-based project.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Identify the objectives and technical problems, and propose the solution(s) in the selected industrial-based project; b. Conduct literature search and perform the state-of-the-art and benchmark studies; c. Develop a set of appropriate technical assumptions, and demonstrate engineering and design decisions to formulate the problem and suggest a practical solution for an open-ended real-world automotive engineering and design problem; d. Evaluate the potential impact of their designed solution(s) on the performance, safety, cost, environmental and/or legal aspects; e. Apply appropriate engineering and design tools (analytical, computational, and/or experimental study) for carrying out tasks in the design, development, implementation and evaluation/optimisation to demonstrate the feasibility of their proposed solution(s) with a critical approach; f. Demonstrate knowledge in the design, development, manufacturing and/or management of automotive structures, systems and components; and g. Perform in-depth study of the selected project, and articulate the results, findings and solutions with scientific and logical arguments.

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>In-depth Study of Engineering and Design Tasks in Automobile Industry: Marketing survey; Conceptual design; Engineering design and analysis; Safety and reliability analysis; Testing techniques; Prototyping and development technologies.

Scope of Project: Design, development, manufacturing and/or management of automotive structures, systems and components.

Areas of Project: Mechanical components in automobile; Electrical or electronic components in automobile; Devices design and analysis; Computer-aided technology for component analysis and development; Materials design and analysis; Engine and propulsion components; Safety, sustainability and environmental issues, Marketing and Legal issues, and others pertaining to automotive structures, systems and components in automobile industry.

Knowledge and Skills Required for Performing Project: Problem identification; Literature review; Methodology for data analysis; Engineering design and analysis; Design concept generation; Safety and risk analysis; Prototyping technology; Project management and execution; Report writing and presentation skills.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. Guidance will be given to students during the whole project;
2. Regular group discussions with the project supervisor(s) to ensure the correct direction and focus of the project;
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 development;
5. Prototype and/or computer-aided simulation will be conducted to demonstrate the functionality and safety of the development; and
6. Group and individual oral presentation and examination will be conducted to examine the students' presentation skill, ability to provide prompt response to a question and the levels of understanding of the whole project.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="7">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td></tr>
<tr><td>Guided study</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
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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	f	g
1. Continuous monitoring	20	√	√	√	√	√	√	√
2. Written report	50	√	√	√	√	√	√	√
3. Project presentation and examination	30	√	√	√	√	√	√	√
Total	100							

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

The duration of this project is expected to span over Semester 2 and Summer Term. The students can discuss with their respective academic and/or industrial supervisor(s) on any potential relevant projects, and come up the project proposal at the end of Semester 1. The project can be any topic in the nature of marketing survey, stylish and/or engineering design and analysis, advanced manufacturing technology, electronic and electrical system design and analysis, and quality management that is related to the automotive engineering and design industry (i.e., auto parts, components and systems).

Performance of each student should be assessed individually by his/her supervisor(s) and peer(s), a second assessor, and the examination panel:

The assessment will comprise 100% continuous assessment.

Assessment by supervisor(s) (20%):

1. General attitude, initiative, planning and progress, design and analysis, work accomplishment, and participation in group work etc. of their study project according to the criteria as stated in the objectives; and
2. An interim report of the project with oral presentation may be required.

Assessment by supervisor(s) (25%) and second assessor (25%):

A formal written report at the end of their study project with efforts from other members in the same project group clearly acknowledged and evaluated through the peer assessment exercise.

Assessment by examination panel (30%):

Group and individual oral presentation and examination together with the formal written report.

Student Study Effort Expected	Class contact:	
	▪ Guided study and small group discussion	21 Hrs.
	Other student study effort:	
	▪ Conducting project work	181 Hrs.
	▪ Report writing and presentation	58 Hrs.
	Total student study effort	260 Hrs.
Reading List and References	Students will be guided to search the relevant papers/reports by the supervisor(s) based on the nature of project.	

Subject Description Form

Subject Code	ME592
Subject Title	Dissertation
Credit Value	9
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students an opportunity to conduct an independent study of a substantive research topic in automotive engineering design, manufacture and/or management; and 2. To enhance the students ability in utilizing advanced design concept and analysis, engineering technology and management skill in solving real-life problems in the automotive engineering and design industry through a master-level dissertation.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. identify the objectives and technical problems, and propose the solution(s) in a related substantive research topic; b. conduct literature search and perform the state-of-the-art and benchmark research studies; c. develop a set of appropriate technical assumptions, and demonstrate engineering and design decisions to formulate the problem and suggest a practical and research solution for an open-ended real-world automotive engineering/scientific and design problem; d. apply appropriate scientific/engineering and design tools (analytical, computational, and/or experimental study) for carrying out tasks in the design, development, implementation and evaluation/optimisation to demonstrate the feasibility of his/her proposed solution(s) with different critical approaches and aspects; e. demonstrate in-depth knowledge in the design, development, manufacturing and/or management of automotive structures, systems and components; and f. perform in-depth study of the proposed project, and articulate the research methodologies of data collection and analysis, results, findings and solutions with scientific and logical arguments and conclusions. g. produce and present a master-level dissertation.
Subject Synopsis/ Indicative Syllabus	Students are expected to undertake original independent research project in order to contribute to the in-depth study of engineering/scientific and design tasks, scope and areas of proposed project in the related automobile industry, knowledge and skills required for performing this master-level dissertation.

Teaching/Learning Methodology

1. Guidance will be given to students during the whole research project;
2. Regular discussions with the academic/professional supervisor(s) to ensure the correct direction and focus of the project;
3. The interim report aims at ensuring the proper progress of the research project;
4. The dissertation aims at examining the completeness, quality, workability, practicability and engineering/scientific content of the project development; and
5. Individual oral presentation and examination will be conducted to examine the student's presentation skill, ability to provide prompt response to a question and the levels of understanding of the whole research project.

Teaching/Learning Methodology	Intended subject learning outcomes						
	a	b	c	d	e	f	g
Guided study	√	√	√	√	√	√	√

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	f	g
1. Progress	20	√	√	√	√	√	√	
2. Dissertation	50	√	√	√	√	√	√	√
3. Project presentation and examination	30	√	√	√	√	√	√	√
Total	100							

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

The duration of this dissertation is expected normally to span over 3 normal semesters excluding summer term. The student can discuss with his/her respective academic and/or professional supervisor(s) on any potential relevant projects, and come up the master-level dissertation proposal at the end of Semester 1. The project can be any topic in the nature of automotive/mechanical/electronic and electrical engineering system design and analysis, advanced manufacturing technology, and quality management that is related to the automotive engineering and design industry (i.e., auto parts, components and systems).

Performance of each student should be assessed individually by his/her supervisor(s) and a second assessor, and the examination panel.

	The assessment will comprise 100% continuous assessment. Assessment by supervisor(s) (20%): 1. General attitude, initiative, planning and progress, design and analysis, research methodologies and work accomplishment etc. of his/her research project according to the criteria as stated in the objectives; and 2. An interim report of the research project with oral presentation may be required. Assessment by supervisor(s) (25%) and second assessor (25%): A formal written dissertation at the end of his/her research study. Assessment by examination panel (30%): Individual oral presentation and examination together with the formal written dissertation.	
Student Study Effort Expected	Class contact:	
	▪ Guided study, meetings and oral presentation	21 Hrs.
	Other student study effort:	
	▪ Conducting research project work	249 Hrs.
	▪ Dissertation writing & presentation	90 Hrs.
	Total student study effort	360 Hrs.
Reading List and References	1. Biggam J., Succeeding with Your Masters Dissertation : A Practical Step-by-Step Handbook, Open University Press, latest edition. 2. Blaxter L., How to Research, McGraw-Hill Professional Publishing, latest edition. 3. Bocco T.S. , Hatcher T.G. and Creswell J.W. *Handbook of Scholarly Writing and Publishing*, Jossey-Bass, latest edition. 4. Glatthorn A.A. and Joyner R.L., *Writing the Winning Thesis Or Dissertation: A Step-by-Step Guide*, Corwin Press with Sage Publications Company. 5. Gustavii B. *How to Write and Illustrate a Scientific Paper,* Cambridge University Press, latest edition. 6. The HK PolyU. *Dissertation Handbook for Postgraduate Schemes*, latest edition. 7. Weissberg R..and Buker S. *Writing up research,* Prentice Hall Regents, latest edition. Journals/Technical Magazine 1. SAE Technical Paper, Society of Automotive Engineers International, USA. 2. IMechE Technical Paper: Journal of Automobile Engineering, Institution of Mechanical Engineers, UK. 3. Automotive Engineering International, Chinese edition. A SAE International Publication in Cooperation with Ringier Trade Media Ltd. 4. Automotive Manufacturing and Design for China, Chinese edition, Ringier Trade Media Publication. Students will also be guided to search the relevant papers/reports by the supervisor(s) based on the nature of research project.	

Intended Blank

Elective Subjects

Subject Description Form

Subject Code	EE541
Subject Title	Advanced Electrical and Electronic Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: Vehicle Electrical and Mechanical Systems (EE540)
Objectives	1. To enable students to acquire knowledge in computerized engine control systems and related systems; 2. To enable students to understand automotive control network protocols; 3. To provide students with a comprehensive understanding of other advanced electronic systems in vehicles; and 4. To enable students to understand other related issues, such as: EMI & EMC issues, future automotive electronics.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Have acquired a good understanding of modern electrical and electronic design of vehicle technologies; b. Appreciate the impact and significance of vehicle technologies on our society; and c. Appreciate the development trend of vehicles.
Subject Synopsis/ Indicative Syllabus	***Computerized Engine Control Systems and Related Systems:*** Fuel injection control. Throttle control. VVT-i - Variable valve timing. VVTL-i - Variable valve timing and lift. Intelligent cruise control. TRC - transmission control. ECT - Electronic controlled transmission. ASC - Acceleration skid control. ***Automotive Control Network Protocols****:* Controller area network (CAN). Local interconnect network (LIN). Time triggered protocol (TTP/C). Media oriented system transport (MOST). IDB (Intelligent Transport System Data Bus). Digital Data Bus (D2B). ***Other Advanced Electronic Systems in Vehicles:*** Automatic vehicle collision avoidance system. Navigation systems. Advanced security systems. LED lighting systems for vehicles. Electronic assisted parking systems. ***Sensors for Electronic Control Systems of Vehicles:*** Fuel flow, air flow, fuel/air mixture, air pressure, speed, acceleration, emission control. ***DC System:*** DC distribution systems. Power line communication and wire harness. Power conversion unit. Advanced battery system. Battery management systems.

Environmental and Other Related Issues: Green vehicles. Computerized diagnosis system for vehicles. EMI & EMC issues in vehicular environment. Drive-by-wire. Drive-by-light. Impacts on future automotive electronics.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination;

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for emerging green automotive electrical and electronic technologies.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lectures	√	√	√
2. Tutorials	√	√	√
3. Case study report and presentation	√	√	√

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	20	√	√	√
2. Case Study	20	√	√	√
3. Examination	60	√	√	√
Total	100			

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The continuous assessment will consist of two components: test, and case study report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

3. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Case study	3 Hrs.
	▪ Group discussions and presentations	3 Hrs.
	Other student study effort:	
	▪ Self study	42 Hrs.
	▪ Assignments/Preparation of Presentation	21 Hrs.
	Total student study effort	102 Hrs
Reading List and References	1. Halderman J.D., *Diagnosis and Troubleshooting of Automotive, Electrical, Electronic, and Computer Systems,* Upper Saddle River, N.J.: Pearson/Prentice Hall, latest edition. 2. Halderman J.D., *Automotive Electricity and Electronics,* Upper Saddle River, N.J., Pearson/Prentice Hall, latest edition. 3. Denton T., *Automobile Electrical and Electronic Systems,* Oxford: Elsevier Butterworth-Heinemann, latest edition. 4. Holt D.J., *The 42-volt Electrical System,* Society of Automotive Engineers International, latest edition. 5. Candela T., *Automotive Wiring and Electrical Systems,* A-A Design, latest edition.	

Subject Description Form

Subject Code	EE542
Subject Title	Car Mechatronics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students with the foundation principles of mechatronic systems, including the hardware and software components; and 2. To study in detail, the various mechatronics systems of cars, including the (i) all-electric power steering system, (ii) active suspension system, (iii) anti-lock braking system, (iv) air-bag system, (v) and the adaptive front lighting system.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the fundamental knowledge of mechatronic systems and components; and b. Appreciate and understand the various key mechatronics systems developed for car use.
Subject Synopsis/ Indicative Syllabus	***Mechatronic System Components in Vehicles:*** Sensors; controllers; motor drives; hydraulic drives; inter-component connections. ***Principle of Feedback Control Systems:*** The feedback principle; control strategies; control performance index; stability and robustness; safety, reliability and redundancy issues. ***All-electric Power Assisted Steering System:*** Torque sensing, electric actuators, system components; change of driving characteristics. ***Active Suspension System:*** Suspension adjustment actuators; modeling and controlling the car suspension; suspension characteristics differences and their modeling. ***Antilock Braking System (ABS):*** Skid sensing, the ABS braking actuator, modeling the car braking dynamics; ABS control strategies. ***Air-bag system:*** Construction of the collision sensor: sensing the collision; airbag mechanics; triggering determination; layout of airbags in cars. ***Adaptive Front Lighting System (AFS):*** Sensing the terrain; moving the headlight; tilting and panning control; advanced features of AFS.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, test, case study report and examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for car mechatronics.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes	
	a	b
1. Lectures	√	√
2. Tutorials	√	√
3. Report	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed	
		a	b
1. Tests	30	√	√
2. Report	10	√	√
3. Examination	60	√	√
Total	100		

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The continuous assessment will consist of two components: report and tests. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

3. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Required

Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Case study discussion & presentation	6 Hrs.
Other student study effort:	
▪ Self study	42 Hrs.
▪ Case study preparation	21 Hrs.
Total student study effort	102 Hrs.

Reading List and References	1. Denton T., *Automotive Electrical and Electronic Systems*, Oxford Elsevier Butterworth-Heinemann, latest edition. 2. Bolton W., *Mechatronics- Electronic Control Systems in Mechanical and Electrical Engineering*, Longman, latest edition. 3. Selected papers from "IEEE Transactions on Vehicular Technology".

Subject Description Form

Subject Code	EE543
Subject Title	Hybrid and Electric Car Technology
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Exclusion: Electric Vehicles (EE512)
Objectives	To provide practising engineers with a general knowledge of modern hybrid and electric vehicle technologies.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the technologies related to modern hybrid and electric vehicles. b. Appreciate the impact and significance of hybrid and electric vehicle technologies on our society. c. Explain the development trend of future hybrid and electric vehicles. d. Present the results of study in the form of written reports and oral presentations.
Subject Synopsis/ Indicative Syllabus	***Introduction to Hybrid and Electric Vehicles*:** Historical perspective. Comparison between EV and HEV: performance, advantages and impacts. Market and promotion: infrastructure needs, legislation and regulation. ***Hybrid and Electric Vehicle Design Options*:** EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. HEV configurations: series hybrid and parallel hybrid, torque coordination and control, generator/motor requirements. Vehicle parameters, driving cycles and performance specifications. ***Vehicle Dynamics and Motor Drives*:** Road load: vehicle kinetics; effect of velocity, acceleration and grade. EV drivetrain and components. Motor drive systems and control strategies. Efficiency mapping. ***Energy Storage*:** Battery systems: battery parameters, types and characteristics, charging schemes and charger design, monitoring techniques. Capacitor systems: supercapacitors, ultracapacitors. Hydrogen storage. Flywheel systems. ***Emerging Technologies*:** Fuel cell and alternative fuel electric vehicles (FEVs and AFEVs). Case studies on commercialized HEVs and EVs. Research and development activities.

Teaching/Learning Methodology

1. Delivery of the subject is mainly through formal lectures, complemented by tutorials and worked examples.
2. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made.
3. A term paper and a related presentation enable students to develop skills in literature survey and writing. Oral presentation sessions develop students' skills in spoken communication and peer evaluation.
4. A technical visit gives students exposure to hybrid/electric car manufacturing technologies and motor drives for electric vehicles.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures	√	√	√	
2. Tutorials	√	√		
3. Assignment and oral presentation	√	√	√	√
4. Technical visit	√		√	

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. Test	25	√	√	√	
2. Assignment	10		√	√	√
3. Oral presentation	5				√
4. Examination	60	√	√	√	
Total	100				

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. It is an advanced elective on hybrid and electric vehicles. The outcomes on hybrid and electric vehicle technology and its impacts are assessed by the usual means of test and examination, and partly by the written assignment.

3. The outcomes on technical communication and presentation skills are evaluated by the assignment and a related oral presentation.

Student Study Effort Required	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial	3 Hrs.
	▪ Group discussions and presentations	3 Hrs.
	Other student study effort:	
	▪ Self-study and revision	52 Hrs.
	▪ Assignment	8 Hrs.
	Total student study effort	99 Hrs.
Reading List and References	1. Husain I., *Electric and Hybrid Vehicles: Design Fundamentals*, CRC Press, latest edition. 2. Larminie J. and Lowry J., *Electric Vehicle Technology Explained*, Wiley, latest edition. 3. Miller J.M., *Propulsion Systems for Hybrid Vehicles*, IEE Power & Energy Series 45, latest edition. 4. Ehsani M., Gao Y., Gay S.E. and Emadi. A., *Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory and Design*, CRC Press, latest edition. 5. Selected papers from relevant journals and conference proceedings.	

Subject Description Form

Subject Code	ISE5011
Subject Title	Project Management in Auto Industry
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/Exclusion	Students should have basic knowledge of project management or working experience in the auto industry.
Objectives	This subject provides students with: 1. the theory and concept of leadership in project management and skills for analysing and applying engineering project tools to design in the auto industry; 2. working knowledge of engineering methodologies in the auto industry in terms of the time-cost relationship, resources, processes, and risks; 3. the ability to select the essential elements and practices needed to develop and implement an engineering project using the systems engineering approach; and 4. the ability to analyse and evaluate engineering best practices.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students will be able to a. apply the concept of leadership in project management and the skills required for analysing and applying engineering project management tools to design in the auto industry and their organisations; b. understand engineering methodologies in terms of the time-cost relationship, resources, processes, and risks; c. select the essential elements and practices needed to develop and implement an engineering project using the systems engineering approach; and d. analyse and evaluate engineering best practices.
Subject Synopsis/ Indicative Syllabus	***Organisation:*** General organisational concepts, including line-and-staff structure, matrix structure, and special projects. ***Systems Methodologies:*** Systems concepts and principles, development life cycle, and process. Engineering templates and techniques for project planning: WBS, CPA, Gantt chart, PERT, and resource smoothing. ***Cost Planning and Control of Projects:*** Project costing, budgeted cost for work scheduled (BCWS), budgeted cost of work performed (BCWP), actual cost for work performed (ACWP), earned value control, engineering contracts. ***Assessment and Control of Engineering Projects:*** Managing project risk, portfolio management, control of change.

Teaching/Learning Methodology

1. Some material is presented in lectures and other material is covered through direct study to enhance students' "learning to learn" ability (learning outcomes (a) to (d)).

2. A problem-based learning approach is applied to the case studies and tutorial exercises (learning outcomes (c) to (d)).

3. Students present an integrated group project, which enables them to demonstrate their ability to integrate various techniques in project management in the auto industry, and show how such techniques can be applied in real-life situations (learning outcomes (b) to (d)).

Teaching/Learning Methodology	Intended subject learning outcomes					
	a	b	c	d		
1. Formal lectures	√	√	√	√		
2. Case studies and tutorials			√	√		
3. Group 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		
1. Tutorial exercises	20		√	√			
2. Individual assignments and quizzes	50		√	√			
3. Project report	15	√	√	√	√		
4. Project presentation	15	√			√		
Total	100						

1. Continuous assessment consists of four components: tutorial exercises (20%), individual assignments and quizzes (50%), a project report (15%), and a project presentation (15%).

2. The coursework involves individual and group work to study cases that simulate real-life management situations in the auto industry. Through such exercises, students' ability to apply and synthesise the acquired knowledge can be assessed on the basis of their performance in group discussions and oral presentations, and the quality of their written reports on these case studies.

Student Study Effort Expected	Class contact:	
	▪ Lectures	30 Hrs.
	▪ Tutorials	6 Hrs.
	▪ Case study and presentation	6 Hrs.
	Other student study effort:	
	▪ Research and preparation	60 Hrs.
	▪ Report writing	16 Hrs.
	Total student study effort	118 Hrs.
Reading List and References	1. Heizer J. and Render B., *Production and Operations Management–Strategies and Tactics*, Allyn and Bacon, latest edition. 2. Ghattas R.G. and McKee S.L., *Practical Project Management*, Prentice Hall, latest edition. 3. Kerzner H., *Project Management*. John Wiley & Sons, Inc. latest edition. 4. Morse L. et al., *Managing Engineering and Technology*. Prentice Hall, latest edition. 5. Smith N.J., *Engineering Project Management*, Oxford: Blackwell Science, latest edition.	

Subject Description Form

Subject Code	SD5801
Subject Title	Ergonomics, Anthropometrics and Organisation
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have a basic understanding of fundamentals of car design.
Objectives	This subject is intended to provide the student with an in-depth understanding of the principles and design issues of ergonomics, anthropometrics and organisation.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the base factors affecting vehicle ergonomics; b. Understand the human factors which affect the safety of driving vehicles; and c. Understand the whole vehicle development process, from development stage to marketing.
Subject Synopsis/ Indicative Syllabus	***Ergonomics:*** The study of people in working conditions within a vehicle: factors which affect the body panel of the vehicle. ***Anthropometrics:*** Understand human factors which affect the safety and other related issues. How different legislations differ in different regions relating to human factors. ***Organisation and Development Process:*** Understanding the elements in the creation of a vehicle, from creative stage, through development stage to marketing.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, tutorial sessions, homework assignments, in-class work & presentations, group work and final test etc.

2. The continuous assessment is aimed at providing students with integrated knowledge required for ergonomics, anthropometrics, and organisation & development process.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lectures (plain & interactive)	√	√	√
2. Tutorials	√	√	√
3. Homework (individual & group)	√	√	√
4. In-class work & presentations	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Class participation	30	√	√	√
2. Group work	30	√	√	√
3. Final Test	40	√	√	√
Total	100			

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

1. The assessment will comprise 100% continuous assessment.

2. The continuous assessment will consist of three components: class participation, group work and final test. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

Student Study Effort Expected

Class contact:	
▪ Lecture	21 Hrs.
▪ Tutorial	24 Hrs.
Other student study effort:	
▪ Self study	29 Hrs.
▪ Individual work	26 Hrs.
Total student study effort	100 Hrs.

Reading List and References	1. Chaffin D.B., Digital Human *Modelling for Vehicle and Workplace Design*, Warrendale, PA, Society of Automotive Engineers, latest edition. 2. Peacock B., *Automotive Ergonomics*, London, Washington, DC: Taylor & Francis, latest edition. 3. Kroemer, K.H.E., *Ergonomics: How to Design for Ease and Efficiency*, Upper Saddle River, N.J.: Prentice Hall, latest edition. 4. Val Prushinskiy & Co, *Hybridization- The New Warfare in the Battle for the Market*, 2005. 5. Lehmann D.R., *Product Management*, New York, NY: McGraw-Hill/Irwin, latest edition. 6. Croney J., *Anthropometrics for Designers*, London, Batsford; New York, Van Nostrand Reinhold, 1971. 7. Pheasant S., *Bodyspace: Anthropometry, Ergonomics and the Design of Work*, Boca Raton: CRC Press, 2006. 8. Lange W. and Windel A., *Kleine Ergonomische Datensammlung*, TÜV Media, Köln, D, latest edition. 9. Stuart M., *H-Point: The Fundamentals of Car Design & Packaging*, Design Studio Press, Culver City, USA, latest edition. Journals: SAE Technical Paper, Society of Automotive Engineers International, USA IMechE Technical Paper: Journal of Automobile Engineering, Institution of Mechanical Engineers, UK

Subject Description Form

Subject Code	ME5019
Subject Title	Safety and Reliability in Car Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To develop students' understanding of the importance of safety and reliability in car design; and 2. To provide students a working knowledge of mandatory requirements and current practices in auto design.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the basic principles of passenger-car safety; b. Understand mandatory requirements relating to car structures and systems; c. Understand fundamental vehicle safety analysis; and d. Familiar with the latest vehicle safety trend.
Subject Synopsis/ Indicative Syllabus	***Road Safety:*** Trends of road safety since early days of the automobile. Basic principles of passenger-car safety. Road traffic accident statistics. Car safety and reliability indicators. ***Mandatory/Functional Requirements:*** Design for vehicle safety with special emphasis on the technical regulations for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles. These vehicle components include doors and door retention components, seats and seat anchorages, child restraints, frontal impact occupant protection, lighting and light-signalling devices, body electronics; speedometers; instrument panel; head restraints; car tyres and rims; anti-theft lock; exhaust smoke emissions; anti-lock braking system; windscreen wipers and washers; GPS navigation systems, etc. ***Reliability Concepts and Safety Analysis of Systems:*** Principles of design for reliability. Parallel and series hybrid systems. Fault tree analysis. Failure mode and effect analysis. Failure characteristics of automotive mechanical, electrical and electronic components. Reliability tests. ***Modern Car Design:*** Safety considerations for modern designs such as hybrid and fuel cell electric vehicles, hydrogen cars, etc.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.

2. The continuous assessment and examination are aimed at providing students with practical knowledge required for safety and reliability in car design.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures	√	√	√	√
2. Tutorials	√	√	√	√
3. Homework assignments	√	√	√	√
4. Case study report & presentation	√	√	√	√

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	10	√	√	√	√
2. Test	20		√	√	
3. Case study report and presentation	10	√	√	√	√
4. Examination	60	√	√	√	√
Total	100				

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The continuous assessment will consist of three components: homework assignments, test, and case study report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

3. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial	3 Hrs.
	▪ Case study presentation & discussion	6 Hrs.
	Other student study effort:	
	▪ Self study	42 Hrs.
	▪ Case study preparation	24 Hrs.
	Total student study effort	105 Hrs
Reading List and References	1. Pimentel, J.R., *Safety-Critical Automotive Systems*. Society of Automotive Engineers, latest edition. 2. Laws of Hong Kong, Cap.374 – *Road Traffic (Construction and Maintenance of Vehicles) Regulations*. 3. Faith N., *Crash The Limits of Car Safety*. Boxtree, latest edition. 4. West M., *The Electric Car: Development and Future of Battery, Hybrid and Fuel-cell Cars (Power & Energy)*. Institution of Engineering and Technology, latest edition. 5. Viano D.C., *Role of the Seat in Rear Crash Safety*. Society of Automotive Engineers, latest edition. 6. Fülep,T., *Design Methods of Safety-Critical Electronic Automotive Systems: Quality – Requirement – Reliability*. Lap Lambert Academic Publishing, latest edition.	

Subject Description Form

Subject Code	ME5104
Subject Title	Advanced Vehicle Materials Technology
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in materials science and mathematics.
Objectives	This subject aims at providing students advanced knowledge on materials used in the automotive engineering industry through lecturing, practical training and case studying approaches. The focus is placed on the up-to-date vehicle design and development, which targets on environmentally-friendly approach that makes the vehicle lighter and safe, and consequently to reduce the fuel consumption and thus emission from vehicles. The co-relationships in terms of production cost, manufacturability, materials and safer structure design will be introduced.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Have a better understanding about advanced materials technology for car design; b. Have competency in adopting different manufacturing processes for advanced materials in car design; and c. Have better knowledge on car safety
Subject Synopsis/ Indicative Syllabus	***Vehicle Materials (Metals and Polymers):*** Steel durability and structural efficiency; Hybrid metal/plastic systems; Materials property charts and performance indices; Aluminium alloys; Magnesium die-casting alloys; Recyclability (metallic and polymeric materials); ***High Strength Composite Materials:*** Fibre-reinforced polymer composites. Hand lay-up. Resin transfer moulding process. Vacuum bagging process. Foams (acoustical materials), nanomaterials and metal matrix composites. ***Construction:*** Cost impact. Fastening systems and joints. Advanced adhesion. Surface treatment and coating technologies. Protection of materials. ***Structure and Safety:*** Structure analysis; Buckling of structures; High-impact resistance Sandwich structures; SWOT analysis for automotive composites and plastics.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, assignments/laboratory work, test, case study and examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced vehicle materials technology.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lectures	√	√	√
2. Tutorials	√	√	√
3. Homework assignments	√	√	√
4. Case study	√		√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments/Laboratory	25	√	√	√
2. Test	15	√	√	√
3. Examination	60	√	√	√
Total	100			

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

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The continuous assessment will consist of three components: assignments/laboratory work, test, and case study. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

3. Laboratory session will provide practical training on the fabrication of advanced materials for the automotive industry.

4. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Visit	3 Hrs.
	▪ Laboratory	3 Hrs.
	Other student study effort:	
	▪ Self study	42 Hrs.
	▪ Case study	24 Hrs.
	Total student study effort	105 Hrs**.**
Reading List and References	1. Fenton, J., *Advances in Vehicle Design*. Professional Engineering Publishing, UK, latest edition. 2. Materials Innovation and Advances in Coating Technology (SP-1851), Society of Automotive Engineers International, USA, latest edition. 3. Heisler H., *Advanced Vehicle Technology*. Butterworth Heinemann, UK, latest edition. 4. Friedrich K., Fakirov S. and Zhang Z., *Polymer Composites: From Nano- to Macro-Scale*. Polymer Science, USA, latest edition.	

Subject Description Form

Subject Code	ME5105
Subject Title	Concurrent Engineering and Computer-Aided Technology
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have the basic knowledge in product design and manufacturing.
Objectives	1. To teach fundamental knowledge in automotive Concurrent Engineering (CE), enabling technologies for realization of automotive concurrent engineering and its deployment; 2. To teach technologies in automotive product modelling, automotive data exchange techniques, automotive technological data and information flow in automotive development life cycle; 3. To provide students with the basis of CAE simulation, the fundamentals for establishment of Finite Element Method (FEM) model, FEM simulation in automotive industry; 4. To equip students with the principle and theory of automotive manufacturing process simulation, including forming process simulation and casting process simulation. The applications of process numerical simulation technologies in supporting the automotive part and component design, automotive manufacturing process determination, tooling design and product quality assurance and control; and 5. To introduce popular and commercial CAE simulation and CAD software tools to students.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the concept of concurrent engineering and how it is used in automotive design and development; b. Understand the CAE modeling and data exchange techniques in automotive design and development; c. Understand the principle and theory of simulation of manufacturing processes and how they support the automotive design and development; and d. Use CAE and CAD systems.

<table>
<tr>
<td>Subject Synopsis/ Indicative Syllabus</td>
<td>
Concurrent Engineering: Fundamentals of automotive concurrent engineering. Automotive product life cycle management and product data management. Automotive technological data and information flow, product CAD data exchange (STEP, IGES, STL). Automotive CE deployment.

Computer-aided Design: Automotive product CAD models (wire-frame, surface and solid models). Automotive geometric modelling techniques (curve, surface and solid modelling). Bezier and B-spline curve and surface modeling for car body design. Primitive and feature modeling; automotive assembly modelling. Computer-aided drafting. Detailed case studies on how CAD technology helps the integrated automotive product and process design and development. Introduction to commercial CAD systems.

Computer-aided Engineering: Simulation and modelling techniques for automotive industries. Finite Element Method (FEM). Fundamentals for FEM formulation including direct formulation, the minimum total potential energy formulation, and weighted residual formulation. FEM discretization, element types, boundary conditions and processing. FEM modelling. Case studies on how CAE technology helps automotive product development.

Automotive Manufacturing Process Simulation: Mathematical fundamental for automotive forming and casting simulation. The physical, mathematical and numerical models of manufacturing process simulation. Process simulation for automotive product design, manufacturing process determination and process parameter configuration, tooling design, and quality assurance and control. Introduction to DEFORM and Magmasoft simulation systems and case studies on automotive manufacturing process simulation.

Computer-aided Optimization: Optimization fundamental and techniques. Simulation-based optimization. Computer-aided optimization for size and shape design of automotive products.
</td>
</tr>
<tr>
<td>Teaching/Learning Methodology</td>
<td>
1. Lectures are used to deliver the fundamental knowledge defined in subject syllabus.

2. Tutorials are used to illustrate the application of fundamental knowledge to practical situations.

3. Experiments are used to relate the concepts to practical applications and students are exposed to hands-on experience, proper use of CAD/CAE systems and application of the systems for solving the real problems.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Lectures</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorials</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Experiments</td><td></td><td>√</td><td>√</td><td>√</td></tr>
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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. Assignment	10	√	√	√	√
2. Laboratory	20		√	√	√
3. Project	20	√	√	√	√
4. Examination	50	√	√	√	
Total	100				

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

1. The assessment will comprise 50% continuous assessment and 50% examination.

2. Laboratory session will provide practical training on using Computer-Aided Design (CAD) and Computer-Aided Engineering (CAE) systems.

3. Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by laboratory session and report, assignment and project, which provide timely feedbacks to both lecturers and students on various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial/Visit	3 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Lab report	15 Hrs.
▪ Assignment	21 Hrs.
▪ Project	30 Hrs.
Total student study effort	105 Hrs.

Reading List and References	1. McMahon Chris and Browne Jimmie, *CAD/CAM: Priciples, Practice and Manufacturing Management*, Addison-Wesley, England, latest edition. 2. Lee Kunwoo, *Principles of CAD/CAM/CAE Systems*, Addison Wesley, latest edition. 3. Fuh J.Y.H., Zhang Y.F., Nee A.Y.C. and Fu M.W., Computer-aided Injection Mould Design and Manufacture. Marcel Dekker, New York, latest edition. 4. Rao P.N., *CAD/CAM: Principles and Applications*, McGraw Hill, New Delhi, latest edition. 5. Madenci Erdogan and Guven Ibrahim, *The Finite Element Method and Applications in Engineering Using ANSYS*, Springer, latest edition. 6. Moaveni Saeed, *Finite Element Analysis: Theory and Application with ANSYS*, Prentice Hall, latest edition. 7. Hutton David V., *Fundamentals of Finite Element Analysis*, McGraw Hill, latest edition. 8. Amirouche Farid, Principles of Computer-aided Design and Manufacturing, Pearson Prentice Hall, latest edition.

Subject Description Form

Subject Code	ME5106
Subject Title	Green Automotive Engine Technology
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Thermofluids. Exclusions: Fuels and Engines (ME540), and Prevention & Control of Vehicular Emissions (ME565)
Objectives	To provide students with in-depth knowledge in emerging green automotive engine technologies.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the fuel thermochemistry and fuel quality effects on emissions; b. Understand the automotive engine testing and control; c. Understand the advanced automotive engine technologies; and d. Understand the combustion-related emissions and control technologies in automotive engines/vehicles.
Subject Synopsis/ Indicative Syllabus	***Fuels:*** Fuels and their characteristics. Thermochemistry and fuels. Gasoline fuels. Diesel fuels. Alternative fuels. Fuel quality effects on emissions. Fuel cell. ***Automotive Engine Testing and Control:*** Engine operating parameters and cycles. Dynamometers. Engine performance and combustion analysis. Engine energy distribution and cooling system. Exhaust gas and particulate emissions analysis. Vehicle emissions testing. ***Spark Ignition (SI) Engine Technologies:*** Advancement in air and fuel induction, and fuel injection technology. Lean burn technology. Variable valve timing and control. Alternative fuels for SI engines. ***Compression Ignition (CI) Engine Technologies:*** Advancement in air and fuel induction, and fuel injection technology. Turbocharging and supercharging. Advanced exhaust gas recirculation system. Alternative fuels for CI engines. Homogeneous charge compression ignition (HCCI) engines. ***Combustion-related Emissions and Control Technologies in Automotive Engines/Vehicles:*** Steady-state and transient emissions. Advanced fuel supply and electronic control systems. Advanced exhaust aftertreatment technology. Review of current and projected automotive engine/vehicle emissions concerns and emission-control legislations worldwide.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for emerging green automotive engine technologies.

3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures and tutorials	√	√	√	√
2. Homework assignments	√	√	√	√
4. Case study report and presentation	√	√	√	√

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	15	√	√	√	√
2. Test	20	√	√		
3. Case study report and presentation	15	√	√	√	√
4. Examination	50	√	√	√	√
Total	100				

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

1. The assessment will comprise 50% continuous assessment and 50% examination.

2. The continuous assessment will consist of three components: homework assignments, interim test and case study report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

   The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Case study discussion & presentation	6 Hrs.
	Other student study effort:	
	▪ Self study	45 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Bosch R., *Automotive Handbook*, Society of Automotive Engineers (SAE), USA, latest edition. 2. Bosch R. G., *Gasoline-Engine Management*, Bosch, latest edition. 3. Bosch R. G., *Diesel-Engine Management*, Bosch, latest edition. 4. European Conference of Ministers of Transport, *Vehicle Emission Reductions*, OECD, latest edition. 5. Ferguson C. R. and Kirkpatrick A. T., *Internal Combustion Engines*, 2nd Edition, John Wiley & Sons Inc., latest edition. 6. Guibet J. C., *Fuels and Engines- Technology, Energy and Environment*, Vol. 1 & 2, Technip, Paris, latest edition. 7. Hoag K. L., *Vehicular Engine Design*, Springer-Verlag, latest edition. 8. Klingenberg H., *Automobile Exhaust Emission Testing*, Springer-Verlag, latest edition. 9. Sher E., *Handbook of Air Pollution from Internal Combustion Engines*, Academic Press, latest edition. Journals/Magazines: Atmospheric Environment, Elsevier Science Ltd. Automotive Engineering International Magazine (Chinese Edition), Society of Automotive Engineers International, USA Energy and Fuels, American Chemical Society Publications, USA. Journal of Automobile Engineering, Institution of Mechanical Engineers, UK. SAE Technical Papers & Automotive Engineering International Magazine, Society of Automotive Engineers International, USA. Transport Research Part D: Transport and Environment, Elsevier Science Ltd.	

Subject Description Form

Subject Code	ME5107
Subject Title	Noise, Vibration and Harshness in Automobile Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in physics (acoustics and vibration).
Objectives	The subject aims to teach students the underlying mechanisms of the noise, vibration and harshness in automobile design, from sound behavior and its quantification, to control of both external and interior noise. The state-of-the-art control algorithms will be studies. The course ushers students to explore new broad but in-depth knowledge in noise and vibration control for automobile. It also aims to promote students to gain hands-on experience in acoustic test, so as to foster their critical thinking and creative solving skills towards a practical acoustic engineering problem.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students are expected to be able to: a. Understand the basic physics of sound and acoustic parameters; b. Understand the vibration mechanisms and measuring method; c. Understand noise sources and sound propagation in the automobile and its controlling method; and d. Understand the sources of vibration and controlling method.
Subject Synopsis/ Indicative Syllabus	***Sound Behavior and its Quantification:*** Basic concept about sound; hazard of noise to passengers. Sound intensity measurements. Sound propagation characteristics. Acoustic parameters. Sound pressure level and sound intensity; frequency and time weightings. Sound measurement. Microphone, sound intensity and sound level meters. ***Vibration Behavior and its Quantification:*** Basic concept about vibration. Hazard of vibration to vehicles. Discrete system and continuous system. Free and forced vibration. resonances and flutters. Vibration transmission and isolation. Vibration measurements. transducers and instrumentation. Signal processing and modal analysis. ***External Noise: Assessment and Control:*** Noise source ranking, air intake system and exhaust system. Flow duct acoustics and muffler design. Helmholtz resonators. Tyre noise. ***Internal Noise: Assessment and Control:*** Acoustic resonance inside an enclosure. Sound power of IC engines and other vehicle noise sources. Noise estimation inside an enclosure. Sound absorption and characterization of sound absorption materials. Free field and diffuse field. Near field and far field. Different noise sources. Engine noise. Noise transmission through panels. Structural-borne and air-borne noise.

<table>
<tr><td></td><td>Sources of Vibration and Control: Damping of vibration. Vibration isolation and absorption. Vehicle suspension and surface coating. Vehicle and chassis vibration and ride quality.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures, tutorial sessions/visits, coursework, laboratory work and examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for noise, vibration and harshness in automobile design.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Lectures</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorials/Visits</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Experiment</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</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Coursework</td><td>20</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Laboratory</td><td>20</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></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:

1. The assessment will comprise 40% continuous assessment and 60% examination.

2. The continuous assessment will consist of two components: coursework (e.g., assignments and an individual project etc.) and laboratory session They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt. In addition, the laboratory session will provide practical training and hands-on experience on the vibration and noise control for the automotive industry.

3. The examination will be used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.
</td></tr>
</table>

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Laboratory	6 Hrs.
	Other student study effort:	
	▪ Self study	50 Hrs.
	▪ Homework assignments	16 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Harrison M., *Vehicle Refinement: Controlling Noise and Vibration in Road Vehicles*, Elsevier, Amsterdam, latest edition. 2. Gatti P. and Ferrari V. *Applied Structural and Mechanical Vibrations: Theory, Methods and Measuring Instrumentation*, E & FN Spon, London, latest edition. 3. Thomson W. T., *Vibration Theory and Applications*, Allen & Unwin, London, latest edition. 4. Bies D. A. and Hansen C. H., *Engineering Noise Control: Theory and Practice*, E & FN Spon, latest edition.	