THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING
電機及電子工程學系

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MASTER OF SCIENCE IN ELECTRIC VEHICLES

(Programme Code : 46012-EV/EVT)

PROGRAMME REQUIREMENT DOCUMENT

(For 2024/25 intake)

September 2024

CONTENTS

This Programme Requirement Document is applicable for 2024-25 intakes. It is subject to review and changes which the Programme Offering Faculty/Department may decide to make from time to time. Students will be informed of the changes as and when appropriate.

1. General Information

1.1 Programme Title

Master of Science in Electric Vehicles

電動汽車理學碩士

1.2 Programme Code

46012-EV/EVT

1.3 Mode of Study

Mixed-Mode

This programme of study provides an option for students to engage in a full-time (9 credits or more per semester) or part-time study load (less than 9 credits per semester). Full-time students normally take 3 to 5 subjects in a semester, and part-time students usually take 2 subjects. Students may have their study load vary from semester to semester which will accordingly affect their entitlement to University's services.

1.4 Host Department

The programme is hosted by the Department of Electrical and Electronic Engineering.

1.5 Normal Duration

Award	*Full-time*	*Part-time*
Master of Science (MSc)	1.5 years (3 semesters)	2.5 years (5 semesters)

Student should complete the programme within the normal duration of the programme. Those who exceed the normal duration of the programme will be de-registered from the programme unless prior approval has been obtained from relevant authorities. Refer to Part II of this document on General Assessment Regulations for details.

1.6 Medium of Instruction

English

1.7 Fund Type

Self-financed

1.8 Final Awards

Upon successful completion of the required content of the respective awards, students will graduate with a Master of Science Degree (MSc).

- MSc in Electric Vehicles

Note: Student may apply to exit the MSc programme with a Postgraduate Diploma (PgD), subject to meeting the specified requirements.

1.9 Entrance Requirements

Applicants should have a Bachelor's degree in Electrical Engineering, Electronics Engineering, Automation Engineering, Transportation Engineering, Engineering Science or related disciplines. Applicants with a Bachelor's degree in other disciplines who have at least three years of significant electric vehicle relevant work experience will also be considered. Applicants must also satisfy the English language requirements of the University.

English Language Requirement

Applicants who are not native speakers of English, and the Bachelor's degree or equivalent qualification is awarded by institutions where the medium of instruction is not English, they are expected to provide one of the following proficiency test results (taken in a single sitting within 2 years) for fulfill the following minimum English language requirement for admission purpose:

(a) A score of 80 or above in the Test of English as a Foreign Language (TOEFL) Internet-based test; OR
(b) An Overall Band score of 6.0 or above in the International English Language Testing System (IELTS) Academic module.

Remarks: TOFEL iBT Home Edition, the IELTS Online and IELTS indicator test results will not be considered for meeting the English Language Requirements for taught programmes.

Individual cases will be considered on their own merit by the Department. Applicants may be required to attend interviews or tests to further demonstrate their language proficiency.

1.10 Graduation Requirements

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

(a) Accumulation of the requisite number of credits – 30 academic credits and 1 AIE subject credit (see below) for MSc; 18 academic credits and 1 AIE subject credit (see below) for PgD exit award; and

(b) Satisfying the residential requirement for at least 1/3 of the credits to be completed for the award he/she is currently enrolled, unless the professional bodies stipulate otherwise; and

(c) Satisfying all requirements as defined for the respective awards and as specified by the University; and

(d) Having a Grade Point Average (GPA) of 1.70 or above at the end of the programme;

(e) Having successfully completed the Online Tutorial on Academic Integrity (see below); and

(f) Having fulfilled the National Education (NE) Requirement (see below).

Online Tutorial on Academic Integrity – A mandatory requirement for graduation

To help students understand the importance of academic honesty and learn ways to ensure that their work and behaviour at PolyU are acceptable in this regard, students admitted in 2014/15 and beyond will be required to complete an Online Tutorial on Academic Integrity on a mandatory basis. Students need to complete the Tutorial preferably by Week 5 and the latest by end of the first semester they are admitted to the programme. Students without completing the Tutorial successfully will not be considered for graduation.

The Online Tutorial can be accessed on LEARN@PolyU (理學網). It takes approximately two hours to complete. Detailed information and instructions about the tutorial are posted at "Student Guide on Online Tutorial on Academic Integrity". *https://www.polyu.edu.hk/ogur/docdrive/Academic_Integrity/Student_Guide.pdf*

Academic Integrity and Ethics Requirement – A mandatory requirement for graduation for students admitted in or after 2024/25

Students admitted in 2024/25 and beyond are required to complete the Academic Integrity and Ethics (AIE) Requirement, a 1-credit subject pitched at level 5, normally within their first semester of study, as a graduation requirement for a Master's/PgD award.

The Department will decide on the AIE subject to be included in the curriculum. The academic integrity and ethics subjects will be assessed on a pass/fail grading system and will not be included in the GPA calculation. Tuition fees will not be charged for the 1-credit AIE subject.

National Education (NE) Requirement - A mandatory requirement for graduation for students admitted in or after 2022/23

Students enrolled on taught postgraduate programmes are required to complete the National Education (NE) Requirement. It is a 3-hour online module plus 3 hours of self-study on 'National Education' at their own pace, and pass the assessment (multiple attempts allowed) in the form of multiple-choice questions online as a graduation requirement. Except for students who have been granted an exemption, students without completing the module successfully will not be considered for graduation. Details are posted at *https://www.polyu.edu.hk/ous/nationaleducation/understanding-china-and-hongkong/*.

1.11 Application for Graduation

Application for Postgraduate Diploma exit award

Students who wish to exit the programme with a PgD should submit an application via Form AR84c in the semester they want to do so.

Students should refer to the Student Handbook for the application deadline stipulated for each semester. Applications for graduation will be considered by the Department's Board of Examiners in each semester and the results will be conveyed to students via eStudent (Examination Result Notification). Students will NOT be informed separately of the application results. Students who are unsuccessful in the application should submit another application for graduation in subsequent semester/academic year.

Students can download Form AR84c at
https://www.polyu.edu.hk/ar/web/en/for-polyu-students/application-forms/index.html

1.12 Credit Fee

HK$8,000 per credit (local and non-local students)

1.13 Summer Term Teaching

The Programme does not have a mandatory Summer Term.

1.14 Daytime and Evening Teaching

Subjects will be offered predominately in the evenings. Some subjects may be made available in daytime. In general, each subject requires a 3-hour class per week over a 13-week semester.

2. Aims and Outcomes

2.1 University Mission

The University has the following mission:

(a) To pursue impactful research that benefits the world.

(b) To nurture critical thinkers, effective communicators, innovative problem solvers and socially responsible global citizens.

(c) To foster a University community in which all members can excel in their aspirations with a strong sense of belonging and pride.

2.2 Programme Aims

(a) To provide students with a comprehensive foundation in electric vehicles, covering both research and practical applications.

(b) To meet the growing demand for high-quality professionals in the field of electric vehicles, both in Hong Kong, China, and globally.

(c) To prepare students for future study and research in the field of electric vehicles and to provide them with practical experience in how the industry is adapting to low carbon, and electric mobility solutions.

By achieving these goals, the programme aims to equip students with the knowledge, skills, and experience needed to succeed in the rapidly evolving field of electric vehicles, and to contribute to the development of sustainable transportation solutions for the future.

2.3 Relationship of Programme Aims to University Mission

Programme Aims	University Mission		
	(a)	(b)	(c)
(a)		√	√
(b)		√	√
(c)	√	√	√

2.4 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 postgraduate 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 practices.

2.5 Intended Learning Outcomes of the Programme

The programme has the following intended learning outcomes:

(a) **Professional Competencies in Electric Vehicles:** Students will gain the ability to apply the knowledge and skills learned in this programme to design, develop, and optimize electric vehicles and associated technologies, thereby achieving a high level of professional competency in the field of electric vehicles.

(b) **Critical Thinking and Problem-Solving Abilities:** Students will develop critical thinking skills in identifying and formulating problems related to electric vehicle development, as well as the ability to develop innovative methods for solving problems and making decisions in this field.

(c) **Creativity and Innovation:** Students will learn to appreciate and understand recent findings and advancements in electric vehicle technology and apply them effectively to solve problems and develop innovative solutions in this field.

(d) **Capability for Continual Professional Development:** Through inquiry and reflection on professional practice, students will develop the capability for continual professional development, enabling them to stay up-to-date with the latest developments and advancements in the field of electric vehicles and to continue to enhance their skills and knowledge throughout their careers.

By achieving these intended learning outcomes, students will be well-prepared to make significant contributions to the development of electric vehicles and the transition to sustainable transportation solutions.

2.6 Relationship of Intended Learning Outcomes to Programme Aims

The following table illustrates the relationship between intended learning outcomes and programme aims:

Intended Learning Outcomes	Programme Aims		
	(a)	(b)	(c)
(a)	√		
(b)		√	
(c)			√
(d)			√

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

The following table illustrates the relationship between intended learning outcomes and institutional learning outcomes:

Intended Learning Outcomes	Institutional Learning Outcomes		
	(a)	(b)	(c)
(a)	√		
(b)		√	
(c)		√	
(d)			√

3. Programme Structure and Curriculum

3.1 To be eligible for the award of an MSc, students need to successfully complete 30 academic credits and 1 AIE subject credit. To be eligible for the exit award of a PgD, students need to successfully complete 18 academic credits and 1 AIE subject credit.

Programme Structure		**Core**	**Elective**
MSc	7 Taught subjects + 1 AIE subject + Dissertation	2	5
	10 Taught subjects + 1 AIE subject	2	8
PgD	6 Taught subjects + 1 AIE subject	2	4

Each subject carries 3 credits. Students have the option to take the dissertation which carries 9 credits (equivalent to 3 subjects) which can be counted as elective subjects.

3.2 List of Core and Elective Subjects

Each award has stipulated the requisite number of *core* subjects. Students may choose *Elective* subjects from those listed. Students will be informed of their choices during the online subject registration exercise of each semester. Not all subjects as listed are offered each year. The Department has the absolute discretion in determining the offer schedule.

Core Subjects

EE512	Electric Vehicles
EEE521	Tomorrow's Leader in Electric Vehicles

Elective Subjects

EE520	Intelligent Motion Systems
EE521	Industrial Power Electronics
EE528	System Modelling and Optimal Control
EE535	Maintenance and Reliability Engineering
EE545	Modern Generation and Grid Integration Technologies
EE546	Electric Energy Storage and New Energy Sources for Electric Vehicles
EE548	Advanced Electric Vehicle Technology
EE590	EE Dissertation
EIE568	IoT-Tools and Applications
EIE575	Vehicular Communications and Inter-Networking Technologies
EEE522	Autonomous Vehicles
EEE523	Economics and Markets in Power Systems and Electrified transportation
EEE524	Green Technology and Policy in Electrical Engineering
EEE525	Smart Transportation for Green Cities

AIE Subject

EEE5T03	Engineering Ethics and Academic Integrity

Subject syllabi for core and elective subjects can be found in Part III.

For EE590 EE Dissertation, operational guideline and assessment information can be found in Annex.

3.3 Curriculum Map

The curriculum map shown below indicates how each intended learning outcomes of the programme is addressed by the constituent subjects.

Core / Elective Subjects	Intended Learning Outcomes			
	(a)	(b)	(c)	(d)
EE512 Electric Vehicles (Core)	√		√	√
EE520 Intelligent Motion Systems	√	√	√	√
EE521 Industrial Power Electronics	√	√	√	√
EE528 System Modelling and Optimal Control	√	√	√	√
EE535 Maintenance and Reliability Engineering	√		√	√
EE545 Modern Generation and Grid Integration Technologies	√	√	√	√
EE546 Electric Energy Storage and New Energy Sources for Electric Vehicles	√		√	√
EE548 Advanced Electric Vehicle Technology	√		√	√
EE590 EE Dissertation	√	√	√	√
EIE568 IoT – Tools and Applications	√		√	√
EIE575 Vehicular Communications and Inter-Networking Technologies	√	√	√	√
EEE521 Tomorrow's Leader in Electric Vehicles (Core)	√	√	√	√
EEE522 Autonomous Vehicles	√	√	√	√
EEE523 Economics and Markets in Power Systems and Electrified Transportation	√	√	√	√
EEE524 Green Technology and Policy in Electrical Engineering	√	√	√	√
EEE525 Smart Transportation for Green Cities	√	√	√	√

4. Academic Advising

The Programme Leader is available to answer questions and provide advice. His contact number and email address are given below.

5. Programme Leader

Prof. CHAU Kwok-tong
Chair Professor
Department of Electrical and Electronic Engineering
Tel. 2766 6186
Email: k.t.chau@polyu.edu.hk

6. Programme Operation and Management

6.1 Departmental Postgraduate Programme Committee (DPPC)

The Department of Electrical and Electronic Engineering will be the host department responsible for the administration of the programme and the overall operation and management. The Head of Department can decide on the composition of the Departmental Postgraduate Programme Committee (DPPC) for taught postgraduate programmes. The committee will exercise the overall academic and operational responsibility for the taught programmes and its/their development within defined policies, procedures, and regulations.

The DPPC will be specifically responsible for the following:

6.1.1 the effective operation, organisation, and development of the programme(s), including the coordination of teaching and other inputs and the implementation of University, Faculty and Departmental policies and guidelines for monitoring student progress, student counselling, placements, etc.

6.1.2 implementation of University learning and teaching policies and strategies in the context of academic programmes and identification of areas for enhancement, in collaboration with the Departmental Learning and Teaching Committee (DLTC);

6.1.3 review of academic regulations, admission policy, assessment, and examination methods;

6.1.4 submissions of proposals to appropriate professional bodies and external validating bodies, normally via the Head of the Department and in accordance with the University's established procedures;

6.1.5 the continuing critical review of the rationale, aims, intended learning outcomes (ILOs) and the alignment of teaching, learning, and assessment with the ILOs, programme learning outcomes assessment and its results, and the improvement and development of the programme(s), including the approval of minor changes to the curricula of the programmes;

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

6.1.7 ensuring that the views of students, as reflected by the Student/Staff Consultative Group(s) or additional means as decided by DPPC, and other key stakeholders in the programme(s) are known and taken into account;

6.1.8 the coordination of the programme review procedures and the submission of the Annual Programme Review reports, including the Departmental Overview report.

6.2 Departmental Learning and Teaching Committee (DLTC)

The Committee will serve as a bridge between the University and the Department in the development and implementation of learning and teaching related policies and strategies, and will work closely with the Departmental Postgraduate Programme Committee (DPPC) to address learning and teaching development needs arising from programme reviews and from the broader contexts of university strategic development and global trends in higher education and relevant disciplines. While the DPPC deals with programme-specific issues, the DLTC works on matters that are better addressed at department level. Its main duties are:

6.2.1 To promote and disseminate good practices and innovations in learning and teaching in the department.

6.2.2 To provide input to deliberations on learning and teaching related matters and coordinate departmental consultations as requested by the LTC/FLTC.

6.2.3 To facilitate, support and monitor the implementation of the learning and teaching policies and practices put forth by the University/LTC/FLTC in the department.

6.2.4 To advise on the development of departmental policies, procedures, and quality enhancement strategies on learning and teaching and support their implementation where appropriate.

6.2.5 To plan and coordinate teaching development projects hosted by the department, monitor their progress and quality, and perform relevant approval functions connected with managing the projects.

6.3 Student Staff Consultative Group (SSCG)

To provide adequate and effective opportunities for discussion of the programme between students and staff, a Student-Staff Consultative Group (SSCG) is set up as the formal channel for soliciting student feedback. It consists of student representatives and teaching colleagues of the programme.

The Group's terms of reference are:

(i) To discuss any matters directly related to the programme; and

(ii) To report or make recommendations, as felt necessary, to the Departmental Postgraduate Programme Committee.

PART II

GENERAL ASSESSMENT REGULATIONS

September 2024

CONTENT

1. A Student's Programme of Study

1.1 On admission, students are registered on a Master's Degree (MSc). Students satisfactorily completing a set of subjects in accordance with the given regulations for a specific award will be eligible for a Postgraduate Diploma (PgD) exit award or a Master's degree award with that specific award title. Students are required to accumulate 18 and 30 academic credits plus 1 AIE subject credit in order to be eligible for a PgD exit award and a Master's degree award with a specific award title respectively. Students may be given credit transfer for appropriate study they have earlier successfully undertaken at postgraduate level (see Section 3).

1.2 Unless stated otherwise, a Master's degree consists of a dissertation component, which is normally worth 9 credits. A non-dissertation option is available to students who, instead of doing the dissertation, can take taught subjects with total credits equal to that of a dissertation.

1.3 Full-time students normally take 3 to 5 subjects in a semester, and part-time students usually take 2 subjects. Students may have their study load vary from semester to semester which will accordingly affect their entitlement to University's services.

1.4 The subjects are mostly run in the evenings/on weekends, but some elective subjects may be made available during the day. Classes can also be arranged with such alternatives as full-time weekends or full-time weekdays.

2. Pre-requisites, Co-requisites, Exclusions and Exemptions

2.1 Certain subjects 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 teacher.

2.2 By definition, a subject and its co-requisite must be taken in the same semester.

2.3 In the case that two subjects overlap significantly in content, they can each be specified as 'Exclusion' of each other. Students having completed one of these subjects will not be allowed to take the 'Exclusion' subject. Exclusions, if completed, will not be counted towards award requirement.

2.4 Students may be exempted from taking any specified subjects if they have successfully completed similar subjects previously in another programme or have demonstrated the level of proficiency/ability to the satisfaction of the subject offering Department. Subject exemption is normally decided by the subject offering Department. If students are exempted from taking a specified subject, the credits associated with the exempted subject will not be counted towards meeting the award requirements (except for exemptions granted at admission stage). It will therefore be necessary for the students to consult the Department and take another subject in order to satisfy the credit requirement for the award.

3. Credit Transfer

3.1 At the discretion of the subject offering Department on the recommendation of the Chairman of the Departmental Postgraduate Programme Committee, students may be given credit for previous postgraduate study. A fee will be charged for credits successfully transferred. Transferred credits may not normally be counted towards more than one award[1].

3.2 Normally, 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 approval will take effect only in the semester for which they are approved. A student who applies for transfer of credits for a particular semester will only be eligible for graduation at the end of the semester, even if the granting of the credit transfer will immediately enable the students to satisfy the total credit requirement for the award.

3.3 The validity period of credits previously 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 3.3.1 to 3.3.3 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.

3.3.1 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.

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

3.3.3 Students have been approved for deferment of study.

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

3.5 Normally, not more than 50% of the credit requirement for award may be transferable from approved institutions outside the University. For transfer of credits from programmes offered by PolyU, normally not more than 67% of the credit requirement for award can be transferred. In

[1] Credit transfer from undergraduate studies to postgraduate studies will be allowed on the condition that these credits were on top of the baccalaureate requirements.

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

3.6 For credit transfer of retaken subjects, the grade attained in the last attempt should be taken in the case of credit transfer with grade being carried over. Students applying for credit transfer for a subject taken in other institutions are required to declare that the subject grade used for claiming credit transfer was attained in the last attempt of the subject in their previous studies. If a student fails in the last attempt of a retaken subject, no credit transfer should be granted, despite the fact that the student may have attained a pass grade for the subject in the earlier attempts.

3.7 Students should not be granted credit transfer for a subject which they have attempted and failed in their current study unless the subject was taken by the student as an exchange-out student in his current programme.

4. Registration Period/Study Load/Academic Probation/De-registration

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

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

4.3 For part-time Taught Postgraduate Programmes, the Head of Department may approve the extension of studies up to two years, and Faculty Board Chairman may approve the extension of studies beyond two years and up to four years.

4.4 Students who have exceeded the normal duration of the programme for more than two years (four years for part-time Taught Postgraduate Programmes) and have been de-registered can submit an appeal to the Academic Appeals Committee to request further extension. If the appeal fails, the student shall be de-registered.

Study Load

4.5 Unless exceptional approval is given, the maximum study load to be taken by a student in a semester is 21 credits. For such cases, students should be reminded that the study load approved should not be taken as grounds for academic appeal.

Academic Probation

4.6 Students who have a Grade Point Average (GPA) (See Section 12) lower than 1.70 will be put on academic probation in the following semester. Once when these students are able to pull their GPA up to 1.70 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification, but not in transcript of studies.

4.7 To help improve the academic performance of students on academic probation, these students will be required to take a reduced study load in the following semester (Summer Term excluded).

The maximum number of credits to be taken by the students is decided by the programme host and subject to the approval of the relevant authorities.

Deregistration

4.8 Students will cease to be registered for the Master's award if:

4.8.1 they have reached the final year of the normal period of registration, unless approval has been given for extension; or

4.8.2 they have reached the maximum number of retakes allowed for a failed compulsory subject; or

4.8.3 they fail to register on any subject in a semester without obtaining approval[2]; or

4.8.4 their GPA is lower than 1.70 for two consecutive semesters and their Semester GPA in the second semester is also below 1.70; or

4.8.5 their GPA is lower than 1.70 in 3 consecutive semesters; or

4.8.6 they are granted the Master's award / PgD exit award.

When a student falls within any of the categories as stipulated above, except for 4.8.1 with approval for extension and 4.8.6, the Board of Examiners shall de-register the student from the programme without exception.

4.9 Those students who fall into any of the categories stated in Sections 4.8.1, 4.8.2 and 4.8.4 and 4.8.5 above will be awarded a PgD exit award before being deregistered if they have satisfied the requirements for a PgD exit award.

4.10 Those students who do not fall into any of the categories stated in Section 4.8 above will have "progressing" status.

4.11 The progression of students to the following academic year will not be affected by the GPA obtained in Summer Term, if any.

4.12 A student may be deregistered from the programme enrolled before the time frame specified in Sections 4.8.4 and 4.8.5 if his academic performance is poor to the extent that the Board of Examiners considers that there is not much a chance for him/her to attain a GPA of 1.70 at the end of the programme is slim or impossible.

5. Deferment of Study and Zero Subject Enrolment

5.1 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 Chairman of the Departmental Postgraduate Programme Committee.

5.2 To apply for deferment of study, the student will have to provide strong justification for deferring his studies for one semester or longer. The deferment period will not be counted towards the total period of registration. Where the period of deferment of study begins during a stage for which fees have been paid, no refund of such fees will be made. Students who have been approved for deferment are not entitled to enjoy any campus facilities during the deferment period.

[2] This does not apply if the student is enrolled on the dissertation.

5.3 Students must apply to the Chairman of the Departmental Postgraduate Programme Committee for not taking any subjects in a semester. Otherwise they will be classified as having unofficially withdrawn from their study. Zero subject enrolment will only be considered for one semester at a time. Prior approval must be obtained. 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 total period of registration. A fee for retention of study place will be charged.

6. Subject Registration/Adding and Dropping of Subjects/Withdrawal of Subjects

6.1 In addition to programme registration, students need to register for the subjects at specified periods prior to the commencement of the semester. An add/drop period will also be scheduled for each semester/term. Students may apply for withdrawal of their registration on a subject after the add/drop period if they have a genuine need to do so. The application should be made to the relevant award hosting department and will require the approval of both the subject teacher and the Chairman of the Departmental Postgraduate Programme Committee concerned. Applications submitted after the commencement of the examination period will not be considered. For approved applications of subject withdrawal, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the assessment result notification and transcript of studies, but will not be counted in the calculation of the GPA.

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

6.3 Subject to the maximum study load of 21 credits per semester and the availability of study places, students are allowed to take additional subjects on top of the prescribed credit requirement for award before they become eligible for graduation.

7. Assessment of Taught Subjects

7.1 The assessment regulations adopted by the Department conform to the University's General Assessment Regulations for taught 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 the Board of Examiners which fall outside these Regulations shall be ratified by the Academic Planning and Regulations Committee and reported to Senate as necessary.

7.2 A variety of assessment methods, such as open book examinations, are used. All other forms assessment are included in the term coursework. This may include tests, assignments, projects, essays, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous Assessment assignments, which involve group work, should nevertheless include some individual components therein. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately, and this can result in different grades being awarded to students in the same group.

7.3 Assessment methods and parameters of subjects shall be determined by the subject offering Department. 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. The subject offering department can decide whether students are required to pass both the continuous assessment and examination components, or either component only, in order to obtain a pass. Such requirements would be specified in the subject description forms. Learning outcome should be assessed by continuous assessment and/or examination appropriately, in line with the outcome based approach.

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

Subject grade	***Short description***	***Elaboration on subject grading description***
A+ A A-	Excellent	Demonstrates excellent achievement of intended subject learning outcomes by being able to skillfully use concepts and solve complex problems. Shows evidence of innovative and critical thinking in unfamiliar situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.
B+ B B-	Good	Demonstrates good achievement of intended subject learning outcomes by being able to use appropriate concepts and solve problems. Shows the ability to analyse issues critically and make well-grounded judgements in familiar or standard situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.
C+ C C-	Satisfactory	Demonstrates satisfactory achievement of intended subject learning outcomes by being able to solve relatively simple problems. Shows some capacity for analysis and making judgements in a variety of familiar and standard situations, and is able to express the synthesis or application of ideas in a manner that is generally logical but fragmented.
D+ D	Pass	Demonstrates marginal achievement of intended subject learning outcomes by being able to solve relatively simple problems. Can make basic comparisons, connections and judgments and express the ideas learnt in the subject, though there are frequent breakdowns in logic and clarity.
F	Fail	Demonstrates inadequate achievement of intended subject learning outcomes through a lack of knowledge and/or understanding of the subject matter. Evidence of analysis is often irrelevant or incomplete.

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

Indicative descriptors for modifier grades

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

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

7.6 A numeral grade point is assigned to each subject grade.

The grade points assigned to subject grades attained by students are as follows:

Grade	***Grade Point for grades attained from 2020/21***
A+	4.3
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
F	0.0

7.7 As assessment should be a matter of judgement, not merely a result of computation, the subject lecturer has 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.

8. Retaking of Subjects

8.1 Students may only retake a subject which they have failed (i.e. Grade F or S or U). Retaking of subjects is with the condition that they maximum study load of 21 credits per semester is not exceeded.

8.2 The number of retakes of a subject should be restricted to two, i.e. a maximum of three attempts for each subject is allowed.

8.3 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.

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

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

8.6 In relation to 8.5 above, in case AAC does not approve further retakes of a failed compulsory subject or the taking of an equivalent subject with special approval from the Faculty, the student concerned would be de-registered and the decision of the AAC shall be final within the University.

9. Exceptional Circumstances

9.1 Absence from an assessment component

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

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

9.2 Assessment to be completed

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

9.3 Other particular circumstances

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

10. Eligibility for Award

10.1 A student would be eligible for award if he/she satisfies all the conditions listed below:

10.1.1 Accumulation of the requisite number of credits – 30 academic credits and 1 AIE subject credit for MSc;18 academic credits and 1 AIE subject credit for PgD exit award; and

10.1.2 Satisfying the residential requirement for at least 1/3 of the credits to be completed for the award he/she is currently enrolled, unless the professional bodies stipulate otherwise; and

10.1.3 Satisfying all requirements as defined and/or stipulated for the respective awards and as specified by the University; and

10.1.4 Having a Grade Point Average (GPA) of 1.70 or above at the end of the programme[3];

10.1.5 Having successfully completed the Online Tutorial on Academic Integrity accessed via LEARN@PolyU (理學網); and

10.1.6 Satisfying the National Education (NE) requirement (applicable to students admitted in or after 2022/23) as specified at: https://www.polyu.edu.hk/ous/nationaleducation/understanding-china-and-hongkong/.

10.2 The PgD exit award and Master's degree award are classified as: Distinction, Credit, and Pass.

10.3 A student is required to graduate as soon as he/she satisfies all the conditions for award (see Section 10.1 above). Subject to the maximum study load of 21 credits per semester, a student may take more credits than he/she needs to graduate on top of the prescribed credit requirements for his award in or before the semester within which he/she becomes eligible for award.

10.4 A student, however, will not be granted the same PgD exit award (in the same area) for the second time despite his satisfying the conditions for award as stipulated in Section 10.1 above, if he/she has been granted the award before.

10.5 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 registration status has been reinstated.

[3] For programmes leading to nested awards where satisfaction of the conditions leading to the lesser award is a subset of the conditions leading to the more advanced award, and where students opt to graduate with the lesser award when failing to complete the requirements for the more advanced award, subjects taken solely for fulfilling the requirements for the more advanced award may be excluded in the GPA calculation for the purpose of satisfying this condition (i.e. the student can graduate with the lesser award if the Award GPA of the lesser award can meet the minimum GPA requirement for graduation).

11. Grade Point Average (GPA)

11.1 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 will be computed as follows:

$$\text{GPA} = \frac{\sum_{n=1}^{N} \text{Subject Grade Point}_n \times \text{Subject Credit Value}_n}{\sum_{n=1}^{N} \text{Subject Credit Value}_n}$$

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

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

(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” code, i.e. absent from all assessment components, 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 ranges from 0.00 to 4.30.

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

11.3 Subjects offered contribute equally to the calculation of the GPA and award GPA. The table below shows different types of GPA and their calculation methods:

Types of GPA	Purpose	Rules for GPA calculation
GPA	Determine progression/ graduation	(1) All academic subjects taken by the student throughout his/her study, both inside and outside the programme curriculum, are included in the GPA calculation. (2) For retake subjects, only the last attempt will be taken in the GPA calculation. (3) Level weighting, if any, will be ignored.
Semester GPA	Determine progression	Similar to the rules for GPA as described above, except that only subjects taken in that Semester, including retaken subjects, will be included in the calculation.
Award GPA	For determination of award classification	(1) If the student has not taken more subjects than required, the Award GPA will be as follows: For programmes without level weighting: Award GPA = GPA (2) If the student has taken more subjects than required, refer to Section 11.2 above.

12 Guidelines for Award Classification

12.1 In using these guidelines, the Board of Examiners shall exercise its judgement in coming to its conclusions as to the award for each student, and where appropriate, may use other relevant information.

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.

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

Award	***Award GPA***
Distinction	3.60 – 4.30
Credit	3.00 – 3.59
Pass	1.70 – 2.99

12.3 In awarding a distinction, the Board of Examiners would also take into consideration the amount of credit transfers earned by the student. To be considered for a distinction, the student should normally have no more than 40% of the credits earned by credit transfer [i.e. 4 taught subjects (12 credits) for MSc; 2 (6 credits) for PgD exit award)].

12.4 Students who have committed academic dishonesty or non-compliance with examination regulations will be subject to the penalty of the lowering of award classification by one level. The minimum of downgraded overall result will be kept at a Pass. In rare circumstances where both the Student Discipline Committee and Board of Examiners consider that there are strong justifications showing the offence be less serious, the requirement for lowering the award classification can be waived.

12.5 Decisions by the Boards of Examiners on award classifications to be granted to each student on completion of the programme shall be ratified by the Faculty Board. For cases the decisions of which do not conform to the above indicative GPA range, they should be referred, by the Faculty Board, to the Academic Planning and Regulations Committee for ratification.

13. Appeal Against Assessment Results/De-registration Decisions by the Board of Examiners

A student may appeal against the decision of the Board of Examiners within a stipulated period after the public announcement of the examination results (this refers to the date when results are announced to students via the web). Students should refer to the Student Handbook for details on the appeal procedures.

14. Recording of Disciplinary Actions in Students' Records

14.1 Disciplinary actions against students' misconducts will be entered in students' records.

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

14.3 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, until their leaving the University. The disciplinary probation is normally one year unless otherwise decided by the Student Discipline Committee.

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

~ END ~

PART III SUBJECT DESCRIPTION FORMS

Syllabi for subjects offered by the Department of Electrical and Electronic Engineering are listed below.

EE512	Electric Vehicles
EE520	Intelligent Motion Systems
EE521	Industrial Power Electronics
EE528	System Modelling and Optimal Control
EE535	Maintenance and Reliability Engineering
EE545	Modern Generation and Grid Integration Technologies
EE546	Electric Energy Storage and New Energy Sources for Electric Vehicles
EE548	Advanced Electric Vehicle Technology
EIE568	IoT-Tools and Applications
EIE575	Vehicular Communications and Inter-Networking Technologies
EEE521	Tomorrow’s Leader in Electric Vehicles
EEE522	Autonomous Vehicles
EEE523	Economics and Markets in Power Systems and Electrified Transportation
EEE524	Green Technology and Policy in Electrical Engineering
EEE525	Smart Transportation for Green Cities
EEE5T03	Engineering Ethics and Academic Integrity

Subject Description Form

Subject Code	EE512
Subject Title	Electric Vehicles
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To acquire a broad knowledge on modern electric vehicles (EVs). 2. To understand the development of EVs from technological, environmental, and societal perspectives.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the importance of EVs for environment, energy sustainability and climate change. b. Understand various underpinning technologies for modern EVs, including electric motor drives, energy storage, batteries, charging methods, infrastructure and auxiliary systems. c. Explain the emerging technologies such as hybrid electric vehicles (HEVs), fuel cell electric vehicles (FEV) and energy storage methods.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction to electric vehicles (EVs)*:** Historical perspective. EV advantages and impacts. EV market and promotion: infrastructure needs, legislation and regulation, standardization. 2. ***Electric vehicle (EV) design options*:** EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. EV parameters, driving cycles and performance specifications. Choice of system voltage levels: electrical safety and protection. 3. ***Vehicle dynamics and motor drives*:** Road load: Vehicle kinetics; Effect of velocity, Acceleration and grade. EV drivetrain and components. EV motor drive systems: DC drives, Induction motor drives, Permanent-magnet synchronous motor drives, Switched reluctance motor drives. Control strategies. 4. ***Batteries*:** Battery parameters. Types and characteristics of EV batteries. Battery testing and maintenance; Charging schemes. Battery Management System. Open-circuit voltage and ampere-hour estimation. Battery load levelling Energy Storage. 5. ***Auxiliaries*:** On-board and off-board battery chargers. Energy management units. Battery state-of-charge indicators. Temperature control units. Power steering. 6. ***Emerging EV technologies*:** Hybrid electric vehicles (HEVs): types, operating modes, torque coordination and control, generator/motor requirements. Fuel cell electric vehicles (FEVs): fuel cell characteristics, hydrogen storage systems, reformers. Alternative sources of power: super- and ultra-capacitors, flywheels.

Teaching/Learning Methodology

Delivery of the subject is mainly through formal lectures, complemented by tutorials and worked examples. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made. 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.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	√
Tutorials	√	√	√
Assignment and oral 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. Examination	50%	√	√	√
2. Test	30%	√	√	√
3. Assignment (Term Paper/mini project/ Homework)	20%	√	√	√
Total	100%			

It is an advanced elective on electric vehicles. The outcomes on electric vehicle technology and its impacts are assessed by the usual means of test and examination, and partly by the term paper. The outcomes on technical communication and presentation skills are evaluated by the term paper and a related oral presentation.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	30 Hrs.
▪ Presentation/Tests	9 Hrs.
Other student study effort:	
▪ Self-study and revision	48 Hrs.
▪ Report – Case Study	18 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. David Bricknell, Electric Vehicle Technologies, 2020.
2. K.T.Chau, Energy Systems for Electric and Hybrid Vehicle, IET, Aug 2016
3. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, New York: CRC Press, 2nd edition, 2010.
4. Per Enge, Nick Enge, Stephen Zoepf, Electric Vehicle Engineering, McGraw Hill, 1st Edition, 2020.
5. Dharavath Kishan, Ramani Kannan, B Dastagiri Reddy, Prajof Prabhakaran, Power Electronics for Electric Vehicles and Energy Storage: Emerging Technologies and Developments, CRC Press, 2023

Subject Description Form

Subject Code	EE520
Subject Title	Intelligent Motion Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To describe an in depth knowledge on the design and operation of intelligent motion systems. 2. To relate and compare numerous application examples, which ranges from CD players and hard disc drives to robots and component insertion machines. 3. To enable the students to have the ability to design motion control systems for industry and domestic purposes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Contrast and compare different motion control system configurations, and select the most appropriate one for the task. To comprehend and understand numerous motion control examples for domestic and industrial applications. b. Understand the in-depth knowledge of motion drive and sensing techniques, and the ability to use them in real engineering applications. c. Have a broad understanding of motion control platform hardware and a visionary perspective on the future developments of computing/control hardware.
Subject Synopsis/ Indicative Syllabus	1. ***Structures of intelligent motion systems*****:** Specifications and requirements of intelligent motion systems. Operating modes: point to point motion, trajectory path tracking, velocity path tracking, force and tension control, compliance control, vibration damping. Switching between operation modes. 2. ***Motion actuators and driving techniques*****:** Using Voice Coil Motors and DC brush motors in motion control. AC brushless motors, linear direct drive AC brushless motors and their driving techniques. Stepping motors and their limitations in motion tracking systems. Microstepping and electronic damping of stepping motors. 3. ***Motion sensing and estimation techniques*****:** Optical encoders: working principle, decoding method, and resolution enhancement through interpolation. Syncro-resolvers: working principle and interface electronics. Velocity estimation and position estimation methods for large speed range actuators. 4. ***Motion control platform*****:** Computer hardware requirements. Tightly coupled systems versus distributed systems. Application of DSPs in motion control. Communication methods in motion systems. Real time operating system for motion control. 5. ***Intelligent algorithms for motion control and trajectory generation*****:** PID controllers and their variations. Servo tuning methods. Motion control systems based on state space configuration. States observation and Kalman filters. Using Notch filters in non-rigid systems. Profile generation and motion planning algorithms. 6. ***Issues in multi-axis intelligent motion systems*****:** co-ordinate mapping and dynamics transformation. Multi-axis motion planning and profile generation. Motion synchronisation between axis. Decoupling inter-axis motion interference. Applying MIMO structure in tightly coupled system.

7. ***Case studies in intelligent motion systems*:**

Three examples will be selected from the following list:

a. Optical based position tracking in CD-ROMs and Laser discs.
b. Magnetic head positioning in hard disk drives.
c. Motion control system design in multi-axis robot manipulators.
d. Gantry robot motion systems for SMT component insertion machines.
e. Motion systems in high precision CNC tooling machines.

Case study:

Report on a high performance motion control application example

Teaching/Learning Methodology

Delivery of the subject is mainly through formal lectures, complemented by tutorials and worked examples. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made. 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.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	√
Tutorials	√	√	√
Assignment and oral 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. Examination	60%	√	√	√
2. Test	30%	√	√	√
3. Report	5%	√	√	√
4. Oral presentation	5%	√	√	√
Total	100%			

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a report on an assigned topic; and a power point presentation for the particular topic.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	30 Hrs.
▪ Presentation/Test	9 Hrs.
Other student study effort:	
▪ Case study	18 Hrs.
▪ Self-study	48 Hrs.
Total student study effort	105 Hrs.

Reading List and References

References books:

1. Precision Motion Control: Design and Implementation (Advances in Industrial Control) Dec 10, 2010 by Kok Kiong Tan and Tong Heng Lee, Springer
2. Motion Control Systems, Feb 21, 2011 by Asif Sabanovic and Kouhei Ohnishi, Wiley
3. S. Meshkat, Advanced Motion Control, PCIM reference series in Power Conversion and Intelligent Motion, 1988
4. M.M. Gupta, Intelligent Control Systems: Concepts and Applications, IEEE Press, 1996
5. K. Rajashekara, Sensorless Control of AC Motors, IEEE Press, 1996

Subject Description Form

Subject Code	EE521
Subject Title	Industrial Power Electronics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide power electronics engineers with in-depth knowledge of the industrial power electronics. 2. To provide latest development in power supplies, industrial power electronics system and their applications in renewable energy systems. 3. To give industrial concern in power electronics design including passive components and standards 4. To introduce to students to the various topologies of the power electronics circuits. 5. To enable students to understand the power quality issues and the active and reactive power flow.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire a good understanding of power supply concept and design and be able to analyse the industrial needs for static power conversion. b. Understand the international standards on power electronics design. c. Have a global view on recent development on power electronics and be aware of applications of power electronics in various industries d. Understand the various topologies and working principles of basic power converters e. Work in teams and independently when conducting power electronics design and testing.
Subject Synopsis/ Indicative Syllabus	1. ***Industrial power systems:*** Static power systems, battery systems, AC systems, DC systems, AC-DC power conversion and recent advance in renewable energy systems such as wind and solar power 2. ***Power conversion:*** Soft-switching, power factor correction, inverter configurations and static converters. 3. ***Special environment power electronics:*** Power electronics distribution system, industrial guidelines, variable speed and constant frequency systems, actuation systems, brushless drives and other applications of power electronics in industry 4. ***Industrial power supplies:*** Converter topologies, decentralized power, power modules, electro-magnetic compatibility, international standards and reliability. 5. ***Power quality improvement:*** Fourier analysis of voltage current waveforms, total harmonic distortion, rectifier, passive/active filters, power quality issues, reactive power compensation. 6. ***Devices and Packaging:*** Hermetic and plastic packages, wire bonding, power devices, high temperature effect and substrates. 7. ***Magnetics and capacitors:*** High frequency inductors and transformers, winding techniques, core loss analysis, optimization of magnetics and power capacitors. **Laboratory Experiments :** Select at least one experiment from topics in DC-DC converter, power factor correction, power electronics for DC brushless motors, etc.

Teaching/Learning Methodology

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through experiments and mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. Interactive laboratory sessions are introduced to encourage better preparation and hence understanding of the experiments. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	✓	✓	✓	✓	
Tutorials	✓	✓	✓	✓	
Experiments/Laboratory	✓				✓
Mini-project		✓	✓		✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	✓	✓	✓	✓	
2. Test and/or Assignment	20%	✓	✓	✓	✓	
3. Laboratory performance & report	10%	✓			✓	✓
4. Mini-project & report	10%	✓	✓	✓	✓	✓
Total	100%					

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; laboratory performance evaluation (including punctuality, initiative, and technical reasoning); and laboratory report on a particular experiment.

Student Study Effort Expected

Class contact:	
▪ Lecture/tutorial	33 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Lab report/Mini-project	15 Hrs.
▪ Self-study	51 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. A. M. Trzynadlowski, Introduction to Modern Power Electronics, Third Edition, Wiley, 2015.
2. M.Cirrincione, M. Pucci, G. Vitale, Power Converters and AC Electrical Drives with Linear Neural Networks, CRC Press, 2012.
3. N. Mohan, Power Electronics: Converters, Applications, and Design, John Wiley & Sons, 2012.
4. G. M. Masters, Renewable and efficient electric power systems, John Wiley & Sons, 2004
5. K.W.E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

Subject Description Form

<table>
<tr><td>Subject Code</td><td>EE528</td></tr>
<tr><td>Subject Title</td><td>System Modelling and Optimal Control</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>1. To provide students with a sound knowledge of system identification and modelling techniques in areas of prediction and control.
2. To introduce modern control design techniques.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Model systems using State Variable and Transfer Functions.
b. Design optimal controllers for system models.
c. Apply computer packages for control system modelling and design.
d. Apply control system in practical applications.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>1. System models: functions, transformations and mapping, Laplace transformation and z-transformation, state variables and state space models of dynamic systems, relations between state space models and transfer function models, solutions of unforced linear state equations, matrix exponential, eigenvalues and eigenvectors, Jordan form, solutions of linear state equations, transition matrix.
2. Stability, controllability, and observability: stability, Lyapunov stability, Lyapunov function, controllability and observability, definition and criteria, stabilizability and detectability, feedback control.
3. Optimal control: Calculus of variations, formulation of optimal control problems, Pontryagin maximum principle, Riccati equation, application to linear regulator.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and theories are taught in lectures and tutorials. Computer experiments will be assigned as part of the interactive assignments, where the students are expected to solve theoretical and practical control problems with critical and analytical thinking.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>Lectures</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Tutorials</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Assignments</td><td></td><td></td><td>✓</td><td>✓</td></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	✓	✓	✓	
2. Assignments	40%	✓	✓	✓	✓
Total	100%				

The outcomes on concepts, analytical skills, problem-solving techniques, design and applications, and practical considerations of designing control systems are assessed by the usual means of examination and assignments, including computer-package-based assignments.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Reading and studying	43 Hrs.
▪ Completing assignments	23 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. L. Ljung, System Identification: Theory for the User (2nd Edition), Prentice Hall.
2. C.C. Hang, T.H. Lee and W.K. Ho, Adaptive Control, Instrument Society of America.
3. N. Nise, Control Systems Engineering, Wiley.
4. P. J. Antsaklis and A. N. Michel, Linear Systems, McGraw Hill.

Subject Description Form

Subject Code	EE535
Subject Title	Maintenance and Reliability Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students with a comprehensive understanding on various maintenance management processes. 2. To enable students to understand the impact of maintenance management on railway objectives in safety, reliability and cost effectiveness. 3. To enable students to acquire knowledge and techniques in reliability engineering. 4. To equip students to make decisions on sound maintenance and reliability improvement. 5. To enable students to apply the techniques in reliability engineering to railway operation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the possible faults in railway systems and their impacts to the overall system reliability. b. Develop fault trees for a sub-system in railways and apply various reliability models on fault analysis. c. Discuss system data collection for reliability assessment. d. Evaluate maintenance schedules and assess the corresponding risk with appropriate techniques and tools. e. Review the advantages and limitations on condition-based monitoring maintenance, alternative sourcing of inventory and maintenance outsourcing management for railway assets. f. Organise and present an assigned research topic.
Subject Synopsis/ Indicative Syllabus	**Reliability Engineering** 1. Reliability fundamentals: Reliability Mathematics. Failure distributions. Causes of failures and their treatment. Reliability apportionment and prediction. Reliability data books. Data Recording and Corrective Action System (DRACAS). 2. Reliability analysis and modelling methods: Fault tree analysis, Failure Mode Effects and Criticality Analysis (FMECA), Reliability block diagram, Reliability Growth Models – IBM and Duane Reliability Growth modelling, Reliability testing. Monte Carlo Reliability Simulation. Weibull Analysis. **Maintenance Management** 1. Asset management framework based on ISO55000/55001. Alignment with corporate asset management direction. Asset management organization. Asset management and business sustainability. 2. Maintenance techniques and tools: Maintenance as an essential element for asset management. Reliability Centred Maintenance as a means for maintenance decision. Topics on conditioned based maintenance.

3. Management for business performance: Computerized Maintenance Management System – from planning to implementation. Alternative spare sourcing. Maintenance outsourcing management for railway assets.

Site visits to MTR depots and industrial/research seminars.

Teaching/Learning Methodology

Video clips together with computer animations are used to supplement conventional lectures. Case studies will be used extensively to highlight the practicality of the subject materials being covered. Practitioners are also invited to have experience sharing sessions with the class. A group project is to be carried out to demonstrate and integrate the knowledge learned.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lectures	√	√		√		
Tutorials		√	√		√	
Project works	√	√	√	√	√	√

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. Group Mini Project	20%		√		√	√	√
2. Tests	20%	√		√			
3. Examination	60%	√		√	√	√	
Total	100 %						

This is a specialist subject with bias on maintenance and reliability of railway assets, in particular on rolling stocks. A large number of case studies are discussed in the lectures and the outcomes are to test the understanding of the student on the underlying fundamentals through quizzes, mini-projects and written examinations.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	36 Hrs.
▪ Industrial/Research seminars	3 Hrs.
Other student study effort:	
▪ Assignment and Self-studies	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. V. A. Profillidis, Railway management and engineering, 3rd Edition, Burlington, Ashgate Pub. Co., 2006.
2. P. D. T. O'Connor, Practical Reliability Engineering, Wiley, 2006

	Reference Books: 1. ISO 55000 – Asset Management 2. ISO 55001 - Asset management — Management systems — Requirements 3. ISO 55002 - Asset management — Management systems — Guidelines for the application of ISO 55001

July 2023

Subject Description Form

Subject Code	EE545
Subject Title	Modern Generation and Grid Integration Technologies
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students are expected to have substantial knowledge about electrical power systems. Exclusion: EE501
Collaboration Institute	HK Electric Institute
Objectives	1. To enable students to establish a broad concept on modern power generation technologies, including local relevant renewable energy and gas turbines. 2. To enable students to understand typical renewable energy technologies and related energy storage systems, its associated characteristics, performance, issues of application and related technical considerations. 3. To provide an in-depth knowledge on gas turbine power plants, combined cycle systems, cogeneration and trigeneration systems. 4. To enable students to understand how to integrate renewable energy into power grid, its related issues, concept of micro grid, smart grid, distributed generation and distribution automation.
Intended Learning Outcomes	Upon Completion of the subjects, student will be able to: a. Identify suitable renewable energy source and fuel-mix for electricity generation in Hong Kong under current situations b. Explain the principle of operation for the generation technologies, including their integration into the modern power grid or micro grids. c. Design the overall architecture for the power generation systems and the interfacing parts, and analysis their performance.
Subject Synopsis/ Indicative Syllabus	1. Energy resources and types (1.5 weeks): Renewable and non-renewable energy resources. World potential and trends. Environmental effects. Local relevant renewable energy types and present developments. Role and importance of renewable energy. 2. Wind and solar energy (2 weeks): Overview of wind energy, wind turbine technology, onshore and offshore wind farms, planning considerations for offshore wind farm, wind resource assessment, wind farm siting and optimization, case study. PV technology, PV panel comparison (performance, cost) and criteria for PV module selection, photovoltaic conversion systems, feasibility study and site selection, design and monitoring techniques, new development in PV technology, case study. 3. Energy storage technology (2 weeks): Types of utility scale energy storage systems and the associated power electronic systems and energy management: pumped water storage, hydroelectric dams, batteries, supercapacitors, superconducting magnetic energy and hydrogen storage. Concept of vehicles-to-grid. 4. Gas turbine and cogeneration technology (1 week): comparison of its emission with other fossil fuel plants. Types of gas turbines and its characteristics and operation features. Combined cycle, cogeneration and trigeneration. Major equipment of a Combined Cycle Generation Unit, Thermal cycle and performance indices of combined cycle generation unit.

5. Electrical System in a Power Generation Plant (1 week): Theory of Electricity Generation, Major Electrical Equipment and Machines of a Generation Unit, Power Distribution Systems in a Power Plant, Case study.
6. Grid integration (3 weeks): Integrating renewable energy sources into the power grid, the issues, the associated power electronic systems and its design, load levelling, energy demand response & management, related power dispatching issues. Complementary characteristics among RE sources and energy storages. Case studies: possible example is Longyangxia Dam Solar Park and Alto Rabagao Solar Dam. Applications of smart grids in this area. Concept of micro-grid and distributed generation & distributed automation.
7. Application examples, demonstration and trends (1.5 weeks): Demonstration projects or case study on micro-grid, smart meters, distributed automation, co-generation, trigeneration and vehicle-to-grid concept. Future trends.

Note: 1 week is reserved for test(s) and revision.

Site Visit in a weekend: Lamma Power Station and Lamma Winds

1. L9 Combined-Cycle Generation Unit
2. Gas Receiving Station
3. PV Solar Panel System
4. Wind Turbine

Teaching/Learning Methodology

Delivery of the subject is mainly through formal lectures, complemented by tutorials, work examples/case studies and a visit/ demonstration. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made. Assignments, in-class assignments, tests and final examination will be the assessment tools.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	✓	✓	✓
Work examples/ case studies	✓	✓	✓
Visit/demonstration		✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	✓	✓	✓
2. Tests	15%	✓	✓	✓
3. Assignments	15%	✓	✓	✓
4. In-class assignments	10%	✓	✓	
Total	100%			

This is an advanced and yet appreciation subject for students who are interested in power and energy systems. The outcomes are assessed by usual means of examination, tests and assignments.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.

	Other student study effort:	
	▪ Assignment and Self-study	66 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Ibrahim Dincer and Calin Zamfirescu, "Advanced power generation systems", Elsevier Science, 2014 2. Nicu Bizon, "Advances in energy research : distributed generations systems integrating renewable energy resources", Nova Science Publishers, 2011 3. IEA, "The power of transformation : wind, sun and the economics of flexible power systems", PECD Publishing 2014 4. Mukund R Patel, "Wind and solar power systems : design, analysis, and operation", CRC Press 2006 5. Rolf Kehihofer, "Combined-cycle gas & steam turbine power plants", PennWell, 2009 6. Masoos Ebrahimi and Ali Keshavarz, "Combined cooling, heating and power : decision-making, design and optimization", Elsevier, 2015 7. Ashok D Rao, "Combined cycle systems for near-zero emission power generation", Oxford England : Woodhead Pub., 2012 8. Q Zhong and T Hornik, "Control of power inverters in renewable energy and smart grid integration", John Wiley & Sons, 2013 9. Antonio Moreno-Munoz, "Large scale grid integration of renewable energy sources", IET 2017 10. Ali Keyhani, "Design of smart power grid renewable energy systems", Wiley, 2011 11. Fereidon P Sioshansi, "Smart grid integrating renewable, distributed & efficient energy", Elsevier/Academic Press, 2011 12. K. Salman, "Introduction to the Smart Grid: concepts, technologies and evolution", IET 2017	

Subject Description Form

<table>
<tr><td>Subject Code</td><td>EE546</td></tr>
<tr><td>Subject Title</td><td>Electric Energy Storage and New Energy Sources for Electric Vehicles</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>1. To acquire a broad knowledge on classical and modern electric energy storage
2. To understand the development of energy storage from technological, environmental, and societal perspectives.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Understand the importance of energy storage as it pertains to environmental concerns, energy sustainability and climate change.
b. Understand various underpinning technologies for conventional and modern energy storage including both portable and stationary systems, such as batteries, supercapacitors, compressed air, flow batteries, new fuel, and fuel cells.
c. Explain the role of energy storage in new energy in electric vehicles (EV) and discuss how energy storage devices can be optimally integrated for these applications.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>1. Concept of energy storage: History of energy storage, classification of the types of energy storage.
2. Electrochemical storage: Lead-acid and Nickel batteries, Lithium/sodium-based battery, Flow and Redox batteries, Fuel cell, Sustainability considerations for future electrochemical systems.
3. Carbon-hydride: Carbon hydride energy storage system, non-carbon based fuel, cracking, fuel transportation, fuel storage.
4. Mechanical storage: Compressed air energy storage, pumped hydro energy storage, flywheels.
5. Static Energy Storage: Super-capacitor, Magnetic Energy storage.
6. Electrical energy storage parameters: State of Charge, State of Health, cell impedance and electrochemical impedance spectroscopy, cell models
7. Energy management System: Battery management, Energy management, cell equalization, conditional monitoring.
8. New Energy for vehicles: Solar vehicles, Fuel cell vehicles, hydrogen engine, compressed gas vehicles, power conversion for new energy.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Delivery of the subject is mainly through formal lectures, complemented by tutorials. worked examples and assignment. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="3">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Lectures</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Tutorials</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Assignment</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignment	25%	✓	✓	✓
2. Test	25%	✓	✓	✓
3. Examination	50%	✓	✓	✓
Total	100 %			

The assignment is designed to assess students' understanding of the energy storage principles and whether they can present the study clearly. It may include take-home assignment and/or miniproject.

The test is designed to assess students' understanding of the topics that they have learnt relative to learning outcomes (a), (b) and (c). The test is usually conduced in the mid-semester to measure students' performance.

Examination: questions are designed to assess learning outcomes (a), (b) and (c). Students are required to answer questions that cover all of the learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial and presentation	9 Hrs.
Other student study effort:	
▪ Mini project or Assignment	27 Hrs.
▪ Self-study	49 Hrs.
Total student study effort	115 Hrs.

Reading List and References

1. "Battery Systems Engineering", A John Wiley & Sons, Ltd., Publication, 2013
2. Sheldon S. Williamson, "Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles", Springer New York, 2013
3. Gregory L. Plett, "Battery Management Systems", Boston : Artech House 2015
4. Serguei N. Lvov, Introduction to Electrochemical Science and Engineering. Boca Raton: CRC Press, 2015.
5. G. Pistoia and B.Liaw, "Behaviour of Lithium-Ion Batteries in Electric Vehicles: Battery Health, Performance, Safety, and Cost", Green Energy and Technology, 2018.
6. R.Xiong, "Battery Management Algorithm for Electric Vehicles", 1st ed., Kindle Edition, 2020.
7. Nicolae Tudoroiu, Battery Management Systems of Electric and Hybrid Electric Vehicles, Mdpi AG, 2021
8. Junqiu Li, "Modeling and Simulation of Lithium-ion Power Battery Thermal Management (Key Technologies on New Energy Vehicles) Springer, 2022.

Subject Description Form

Subject Code	EE548
Subject Title	Advanced Electric Vehicle Technology
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE512
Objectives	1. To acquire a high level of electric vehicles technology and future EV design 2. To understand the development of the impact of electric vehicles on society and security.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the advanced knowledge of the electric vehicle. b. Understand various advanced parts and components in electric vehicles. c. Understand the future energy sources and storage for electric vehicles. d. Impact of electric vehicles and emerging technologies.
Subject Synopsis/ Indicative Syllabus	1. ***Future EV design and demand:*** All electric parts and components design, configurable EVs, high speed vehicles, hyperloop vehicle, Magnetic levitation vehicle. 2. ***Advanced motor drive:*** In-wheel motor, anti-braking system (ABS), Continuously Variable Transmission (CVT), active suspension. 3. ***Advanced energy storage:*** Distributed energy storage, future battery, future fuel cell. 4. ***Power electronics for EV:*** High power density power electronics, High current power electronics. 5. ***EV and security:*** Advantage and disadvantage of EVs, Autocrypt V2G, EV accidents and safety, EV maintenance, Internet of Thing (IoT) for EVs, Intra vehicle security, Vehicle to Data Center security 6. ***Autonomous vehicles:*** Layers of autonomy, Unmanned ground vehicle (UGV), Advanced Driver Assistance Systems (ADAS), Smart sensors, radar, Lidar, Path control. 7. ***Future power sources for EV:*** Photovoltaic to EV, Catenary-free electric trains and Trolley bus, Non-Carbon fuel, New energy for EVs. 8. ***EV policy:*** Government Policy in EVs, Infrastructure of EVs, sustainability and the environment.
Teaching/Learning Methodology	Delivery of the subject is mainly through formal lectures, complemented by tutorials, worked examples and assignment. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures	✓	✓	✓	✓
2. Tutorials	✓	✓	✓	✓
3. Assignment/mini-project	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment/mini-project	15%	✓	✓	✓	✓
2. Test	25%	✓	✓	✓	✓
3. Examination	60%	✓	✓	✓	✓
Total	100 %				

The assignment is designed to assess students' understanding of the advanced electric vehicle principles and its impact to society and whether they can present the study clearly. Oral presentation for their assignment is needed. It includes the take-home- assignment and mini-project.

The test is designed to assess students' understanding of the topics that they have learnt relative to learning outcomes (a), (b), (c) and (d). The test is usually conduced in the mid-semester to measure students' performance.

Examination: questions are designed to assess learning (a), (b), (c) and (d). Students are required to answer questions that cover all of the learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial and presentation	9 Hrs.
Other student study effort:	
▪ Mini project or Assignment	27 Hrs.
▪ Self-study	49 Hrs.
Total student study effort	115 Hrs.

Reading List and References

1. Mark Daly, "Electric Vehicles: A Guide for Just About Anyone", Eninserv Limited, 2017.
2. Sheldon S. Williamson, "Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles", Springer New York, 2013.
3. Tom Denton, "Electric and Hybrid Vehicles", Routledge, Taylor & Francis Group, 2016.
4. Wanrong Tang, Y. J. Zhang, "Optimal Charging Control of Electric Vehicles in Smart Grids", Springer, 2017.
5. Hanky Sjafri. "Introduction to Self-Driving Vehicle Technology", Chapman & Hall/CRC Artificial Intelligence and Robotics Series, 2019.
6. S. Liu, L. Li, J. Tang, S.Wu, J.Gaudiot, "Creating Autonomous Vehicle Systems", Synthesis Lectures on Computer Science, 2020.

Subject Description Form

Subject Code	EIE568
Subject Title	IoT – Tools and Applications
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	The students are expected to have some basic knowledge on computer hardware and software.
Objectives	1. To provide an overview on IoT tools and applications including sensing devices, actuation, processing and communications. 2. To introduce hands-on IoT concepts including sensing, actuation, and communication through lab exercises with IoT development kits.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: **(1) Professional/academic knowledge and skills** a. Understand key IoT concepts on sensing devices, actuation, processing and communications b. Apply skills on prototyping IoT products and applications **2) Attributes for all-roundedness** c. Communicate effectively. d. Think critically and creatively. e. Assimilate new technological development in related field.
Subject Synopsis/ Indicative Syllabus	1. Introduction to Internet of Things (IoT) - Historical background of IoT - The IoT system stack: Sensors, edge computing, networking, cloud computing - How IoT could enable innovative products and services 2. Electronics for IoT - Overview of electronic signals (including sampling and Nyquist theorem) - General Purpose Input/Output (GPIO) and Pulse Width Modulation (PWM) - ADC and DAC concepts - Microcontrollers and computers for IoT (e.g., Arduino, Raspberry Pi, etc.) 3. Sensors for IoT - An overview of sensors commonly used in IoT applications - Sampling frequency and bandwidth requirements for different sensors - Interfacing common sensors and actuators in IoT development kits 4. Software and Data Analytics for IoT - Libraries of development kits and example uses (e.g., for Arduino) - Selection of development programming languages for different IoT services - Web server and web services (e.g., ThingsBoard, MQTT/HTTP) - Data analytics with machine learning techniques (e.g., Python, Anaconda) 5. Low Power Wide Area Networks (LPWAN) - Transmission of latency-sensitive real-time data and reliable signaling data - Protocols for exchanging information among different IoT devices - IoT communication protocols: Sigfox, LoRa, NB-IoT, etc. 6. Internet of Things Capstone - To consolidate and apply knowledge learnt in the subject with an IoT project

Teaching/Learning Methodology	Intended Subject Learning Outcomes				
	a	b	c	d	e
Lecture	✓				
Tutorial and Lab	✓	✓		✓	
Mini-project	✓	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

(should this be "Alignment of Assessment and Intended Subject Learning Outcomes"?)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Assignments	20%	✓		✓	✓	
2. Test/Quizzes	20%	✓		✓	✓	✓
3. Lab	20%		✓		✓	✓
4. Mini-project	40%	✓	✓	✓	✓	✓
Total	100%					

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

Assignments and test/quizzes let students review the taught materials, do further reading for deeper learning and apply the learnt materials to solving problems.

Lab exercises and the mini-project require students to do further reading, search for information, keep abreast of current IoT development, develop their own IoT prototypes, give a presentation and write a report.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	24 Hrs.
▪ Laboratory sessions	15 Hrs.
Other student study effort:	
▪ Lecture: further reading, doing homework /assignment	72 Hrs.
Total student study effort	111 Hrs.

Reading List and References

1. R. Buyya, A. V. Dastjerdi, *Internet of Things: Principles and Paradigms*, Cambridge, MA, 2016.
2. James, A., Seth, A., & Mukhopadhyay, S. (2022). *IoT System Design : Project Based Approach* (1st ed. 2022.. ed., Smart Sensors, Measurement and Instrumentation, 41). Cham: Springer International Publishing : Imprint:

	Springer. (Full text available at: SpringerNature Complete eBooks via PolyU Library) 3. Tamboli, A. (2019). *Build your own IoT platform : Develop a fully flexible and scalable Internet of Things platform in 24 hours*. New York, NY]: Apress. (Full text available at: SpringerNature Complete eBooks via PolyU Library) <u>Others</u>: 4. IEEE Transactions and other journals.

May 2022

Subject Description Form

Subject Code	EIE575
Subject Title	Vehicular Communications and Inter-Networking Technologies
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	The students are expected to have some basic knowledge about wireless communications, computer networks and mobile ad-hoc networks. Extra materials will be provided for self-learning before the commencement of the course on request for those who do not have the appropriate knowledge. Please contact the subject lecturer for details.
Objectives	This subject will introduce students with the emerging technologies, standards and applications in vehicular communication systems. The students will study the design considerations and challenges of vehicle-to-infrastructure and vehicle-to-vehicle communications. Theories such as vehicular mobility modeling, and vehicular technologies and standards from the physical to network layers will be introduced in the course. Examples of emerging applications of vehicular communications in Intelligent Transportation Systems will also be studied and discussed.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: **(1) Professional/academic knowledge and skills** a. Understand and describe the basic theories and principles, technologies, standards, and system architecture of vehicular ad-hoc networks (VANET) or inter-vehicle communication networks. b. Analyze, design, and evaluate vehicular communication platforms for various kinds of safety and infotainment applications. **(2) Attributes for all-roundedness** c. Communicate effectively. d. Think critically and creatively. e. Assimilate new technological development in related fields.
Subject Synopsis/ Indicative Syllabus	1. Introduction Basic principles and challenges, past and ongoing VANET activities 2. Cooperative Vehicular Safety Applications Enabling technologies, cooperative system architecture, safety applications 3. Vehicular Mobility Modeling Random models, flow and traffic models, behavioral models, trace and survey-based models, joint transport and communication simulations 4. Physical Layer Considerations for Vehicular Communications Signal propagation, Doppler spread and its impact on OFDM systems 5. MAC Layer of Vehicular Communication Networks Proposed MAC approaches and standards, IEEE 802.11p 6. VANET Routing protocols Opportunistic packet forwarding, topology-based routing, geographic routing 7. Emerging VANET Applications Limitations, example applications, communication paradigms, message coding and composition, data aggregation 8. Standards and Regulations Regulations and Standards, DSRC Protocol Stack, Cellular V2X

Teaching/Learning Methodology

The theories and applications of VANET will be described and explained in lectures. Techniques and parameters for evaluating various vehicular communication platforms will be presented in tutorials. Students are requested to review latest research papers on VANET and study in detail some selected vehicular communication platforms and their potential applications. Finally, share their findings with other classmates through two presentations and write a report to summarize their findings.

Teaching/Learning Methodology	Intended Subject Learning Outcomes				
	a	b	c	d	e
Lectures	✓	✓			
Tutorials	✓	✓	✓		
Assignments	✓	✓	✓	✓	✓
Mini project/Presentations	✓	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Paper Review	10%	✓	✓	✓	✓	✓
2. Survey Report	15%	✓	✓	✓	✓	✓
3. Test/Quizzes	20%	✓	✓	✓		
4. Lab	5%	✓	✓	✓	✓	
5. Mini project	50%	✓	✓	✓	✓	✓
Total	100%					

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

Paper review, survey report, test/quizzes, and lab exercises let students review the taught materials, do further reading for deeper learning and apply the learnt materials to solving common vehicular communication network problems.

The mini project requires the student to do further reading, search for information, keep abreast of current development, give presentations and prepare written report.

Regarding the use of generative AI tools in the subject:

- Similar to the Internet and other web applications, Generative AI tools such as ChatGPT can be used for brainstorming and data collection in the subject. If used, the data sources should be cited properly.
- However, it is forbidden for essay-type assignments or reports (e.g., paper review, survey report, lab report, and project report). All written assignments will be submitted to Turnitin for plagiarism check and AI writing detection.

Student Study Effort Required

Class contact:	
▪ Lecture/Tutorial/Lab	33 Hrs.
▪ Presentation	6 Hrs.
Other student study effort:	
▪ Lecture: further reading, doing homework/ assignment	30 Hrs.
▪ Mini-project: studying, writing a report, preparing two presentations	40 Hrs.

	Total student study effort	109 Hrs.
Reading List and References	Text book: 1. H. Hartenstein and K. P. Laberteaux, *VANET: Vehicular Applications and Inter-Networking Technologies*, Wiley, 2010. Reference books: 1. P. H.-J. Chong, I. W.-H. Ho, *Vehicular Networks: Applications, Performance Analysis and Challenges*, Nova Science Publishers, 2019. 2. C. Sommer, F. Dressler, *Vehicular Networking*, Cambridge University Press, 2015. 3. M. Emmelmann, B. Bochow and C. C. Kellum, *Vehicular Networking: Automotive Applications and Beyond*, Wiley, 2010. 4. M. Watfa, *Advances in Vehicular Ad-Hoc Networks: Development and Challenges*, Information Science Reference, 2010. 5. H. Moustafa, Y. Zhang, *Vehicular Networks: Techniques, Standards, and Applications*, CRC Press, 2009. Others: 1. IEEE Transactions and other journals.	

July 2023

Subject Description Form

Subject Code	EEE521
Subject Title	Tomorrow's Leader in Electric Vehicles
Credit Value	3
Level	5
Pre-requisite/ Corequisite/ Exclusion	Nil
Objectives	This subject provides a comprehensive exploration of the principles, technologies, societal impacts, policy, business, and project aspects of electric vehicles. Through a series of lectures, seminars, workshops, visits, exchanges with professionals, and case studies, students will gain a detailed understanding of the electric vehicles industry, market, and research development. They will also develop critical thinking, analytical, oral, and written communication skills. By the end of the subject, students will be able to appreciate the challenges and opportunities in the electric vehicles field and propose solutions to address them.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the principles, technologies, and research development of electric vehicles. b. Understand the industry, societal impacts, and policy of electric vehicles. c. Understand the business, market and project aspects of electric vehicles. d. Develop critical thinking and analytical skills to address challenges and opportunities in the field of electric vehicles.
Subject Synopsis/ Indicative Syllabus	1. Introduction to electric vehicles 2. Electric vehicle technologies and components 3. Electric vehicle charging and infrastructure 4. Electric vehicle batteries and energy storage systems 5. Electric vehicle motors and drivetrains 6. Electric vehicle market and industry trends 7. Electric vehicle policy and regulation 8. Electric vehicle business models and financing 9. Electric vehicle projects and case studies 10. Societal impacts of electric vehicles The syllabus is indicative and subject to change based on the instructor's discretion and the needs of the course.
Teaching/Learning Methodology	The subject delivery primarily consists of invited lectures from professionals, such as renowned professors, industrialists, and/or institutional/governmental officials. These lectures may also take the form of workshops, seminars, visits, and forums. In addition, tutorials, work examples, case studies, and assignments will be used to complement the lectures and enhance students' learning experience.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lectures/seminars	✓	✓	✓	✓
2. Tutorials	✓	✓	✓	✓
3. Assignment/mini-project/case studies	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Attendance	10%	✓	✓	✓	✓
2. Assignment	20%	✓	✓	✓	✓
3. Mini-project	30%				✓
4. Case studies	40%	✓	✓	✓	
Total	100%				

The attendance is to encourage students to actively interact with instructors and participate in class discussion.

The assignment is designed to evaluate students' comprehension of subject materials. Students will be required to answer a series of questions for each lecture, seminar, or workshop presented by professionals.

The mini-project is intended to provide students with an opportunity to present their critical thinking and analytical skills of a selected topic. An oral presentation and a take-home report are required.

The case studies are designed to provide students with an opportunity to present their understanding of subject materials through studying various real-world cases covering technologies, societal impacts, policy and business of electric vehicles. Students will be required to submit a written report for each case study.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial and presentation	9 Hrs.
Other student study efforts:	
▪ Assignment, mini-project and case studies	36 Hrs.
▪ Self-study	40 Hrs.
Total student study effort	115 Hrs.

Reading List and References	1. C.C. Chan and K.T. Chau, "Modern Electric Vehicle Technology," Oxford University Press, 2001. 2. J. Larminie and J. Lowry, "Electric Vehicle Technology Explained," Wiley, 2012. 3. K.T. Chau, "Electric Vehicle Machines and Drives – Design, Analysis and Application," Wiley-IEEE Press, 2015. 4. K.T. Chau, "Energy Systems for Electric and Hybrid Vehicles," The IET, 2016. 5. T. Muneer, M.L. Kolhe, and A. Doyle, "Electric Vehicles: Prospects and Challenges," Elsevier, 2017. 6. Z. Ma and S. Zou, "Efficient Auction Games: Theories, Algorithms and Applications in Smart Grids & Electric Vehicle Charging," Springer, 2020. 7. R. Xiong, "Battery Management Algorithm for Electric Vehicles," Springer, 2020. 8. D. Kishan, R. Kannan, B.D. Reddy, and P. Prabhakaran, "Power Electronics for Electric Vehicles and Energy Storage: Emerging Technologies and Developments," CRC Press, 2023. 9. M. Sankir and N.D. Sankir , "Hydrogen Electrical Vehicles (Advances in Hydrogen Production and Storage (AHPS))," Wiley-Scrivener, 2023. 10. C.C. Chan, G.Y. Zhou, and W. Han, "Integration of Energy, Information, Transportation and Humanity - Renaissance from Digitization," Elsevier, 2023.

December 2023

Subject Description Form

<table>
<tr><td>Subject Code</td><td>EEE522</td></tr>
<tr><td>Subject Title</td><td>Autonomous Vehicles</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Corequisite/
Exclusion</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>1. To acquire a high level of electric vehicles technology and future EV design.
2. To understand the development of the impact of autonomous vehicles on society and security.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Understand the advanced knowledge of the electric autonomous vehicle.
b. Understand various sensors and components in autonomous vehicles.
c. Understand the future development for autonomous vehicles.
d. Impact of autonomous vehicles and emerging technologies.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>1. Unmanned vehicle: History of unmanned vehicle, driver assistance functions, and the recent development.
2. Vehicle architecture: System design, hardware requirement, computer processing, end-to-end autonomous driving decision control.
3. Sensors: Sensors requirement, Lidar, Ultrasonic, visual camera, IMU, Radar, GPS.
4. Standard and infrastructure: Classification, SAE standard, connected vehicles, V2X, communication, application, Autonomous Ride Service (ARS), Economic and business model, Autonomous vehicles as a workspace.
5. Software for autonomous vehicle: Navigation and control, 3D-SLAM, HD-Mapping, routing, Motion planning, Perception System, Decision-marking system, Digital recognition, Neural Network, Deep learning model.
6. Control: Electronic control systems, Kinematic model, Geometric control, Dijkstra’s Algorithm, Stanley Controller, Convolution.
7. Legal and policy: Government Policy in autonomous vehicles, social cost of mobility, infrastructure of autonomous vehicles and the environment.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Delivery of the subject is mainly through formal lectures, complemented by tutorials, worked examples and assignment. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made.
<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. Assignment/mini-project</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment/mini-project	25%	✓	✓	✓	✓
2. Test	25%	✓	✓	✓	✓
3. Examination	50%	✓	✓	✓	✓
Total	100 %				

The assignment is designed to assess students' understanding of the advanced electric vehicle principles and its impact to society and whether they can present the study clearly. Oral presentation for their assignment is needed. It includes the take-home assignment and mini-project.

The test is designed to assess students' understanding of the topics that they have learnt relative to learning outcomes (a), (b), (c) and (d). The test is usually conduced in the mid-semester to measure students' performance.

Examination: questions are designed to assess learning (a), (b), (c) and (d). Students are required to answer questions that cover all of the learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial and presentation	9 Hrs.
Other student study effort:	
▪ Mini project or Assignment	27 Hrs.
▪ Self-study	49 Hrs.
Total student study effort	115 Hrs.

Reading List and References

1. Sreevatsan Bhaskaran, Kai Zhou , Andrew Baab, Ronald Calhoun, "Autonomous Vehicle Lidar: A Tutorial", Independently published,2019.
2. Sumit Ranjan, S. Senthamilarasu , "Applied Deep Learning and Computer Vision for Self-Driving Cars: Build autonomous vehicles using deep neural networks and behavior-cloning techniques", Packt Publishing , 2020.
3. Paul McManamon, "LiDAR Technologies and Systems", SPIE--The International Society for Optical Engineering, 2019.
4. Hanky Sjafri. "Introduction to Self-Driving Vehicle Technology", Chapman & Hall/CRC Artificial Intelligence and Robotics Series, 2019.
5. S. Liu, L. Li, J. Tang, S.Wu, J.Gaudiot, "Creating Autonomous Vehicle Systems", Synthesis Lectures on Computer Science, 2020.

Subject Description Form

Subject Code	EEE523
Subject Title	Economics and Markets in Power Systems and Electrified Transportation
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to understand the key and practical issues of restructuring electricity supply industry and to establish a broad knowledge of open electricity market operation. 2. To enable students to understand the key issues in open electricity market operation including deregulated power system operation, procurement of ancillary services, congestion management, so that students are provided with knowledge and techniques they need to meet the electric industry's challenges in the 21st century. 3. To enable students to understand the current development and future progress of the electrical vehicle technology, including the advantages of EVs, the structure of EVs, the economy of EVs, major market players, technical bottlenecks. 4. To enable students to understand the charging technology of EVs, the charging consideration of the EV users, economic charging plan of EVs and corresponding incentive scheme, and optimization of EV charging infrastructure.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire a good understanding of the rationale and key issues for restructuring electricity supply industry, practical operation and design considerations for real world electricity markets, and financial tools to hedge risks used in electricity supply industries. b. Assess ancillary services requirements and values based on security, economic and performance considerations. c. Acquire a good understanding of the EV technology as well as their engagement in economic and green transportation. Assess the EV charging plan and infrastructure installation based on economic and performance consideration. d. Present technical results in the form of technical report and verbal presentation
Subject Synopsis/ Indicative Syllabus	1. ***Restructuring of the Electricity supply industry* (*ESI*):** ESI structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Role of existing players. 2. ***Electricity market*:** Timeline coordination, design considerations and practical operation of a real-world electricity market system. Use of different financial contracts/tools including derivatives and electricity futures for risk management in electricity markets. Game theory approach for market competition analysis. Transmission congestion management in electricity market. Security considerations. 3. ***Ancillary services*:** Transmission ownership and restructuring. Measuring available transmission capacity in energy markets. Purchasing transmission

capacity. Network and point to point transmission services. Fixed and firm transmission rights. Ancillary services and technical specifications, and performance based cost model.

4. ***Advancement of EV technology*:** The development history of EVs. Cost breakdown of EVs. Advantages of EVs. Major market players of EVs. Charging infrastructure of EVs.
5. ***Economic EV operation:*** Mileage anxiety issue of EVs. Charging incentive policies. Planning of charging station for EVs. Charging scheme of EVs.

Teaching/Learning Methodology

The concept of electricity and EV market modelling and economic analysis framework will be presented through lectures and tutorials with reference to real-life market environment. Students will be required to form groups to work through cases covering the market structure and operational aspects so as to develop ability to critically evaluate principles and operation of electricity and EV markets. Tutorials will be structured on different sessions for better understanding on the theoretical concepts which require sufficient contributions from students. Students will also learn through active participation in the presentation of finding of their case studies.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	✓	✓	✓	
Case Studies & 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. Examination	60%	✓	✓	✓	
2. In-class tests	20%	✓	✓	✓	
3. Cases study & presentation	20%	✓	✓	✓	✓
Total	100%				

The outcomes on the concepts of modelling, analysis and applications are assessed by the usual means of examination and tests whilst those on problem-solving techniques and presentation of findings, as well as technical reporting and teamwork, are evaluated by the case study exercise.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Presentation	6 Hrs.
Other student study effort:	
▪ Case study and report	15 Hrs.
▪ Self-study	51 Hrs.
Total student study effort	105 Hrs.

Reading List and References	**Reference books:** 1. D. Gan, D. Feng and J. Xie, Electricity Markets and Power System Economics, CRC Press, 2013 2. D. Kirschen, G. Strbac, Fundamentals of Power System Economics, 2nd Edition, John Wiley & Sons, 2018 3. K. Bhattacharya, M.H.J. Bollen, and J.E. Daalder, Operation of Restructured Power Systems, Kluwer Academic Publishers, 2001

Subject Description Form

Subject Code	EEE524
Subject Title	Green Technology and Policy in Electrical Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To present fundamental concepts on energy and environmental policies and the related green technology. 2. To provide knowledge on development and current status of renewable energy sources, power, hydrogen and carbon market and policies. Emphasis will be placed on technological and socio-economical points of view. 3. To provide knowledge on concept of green technology, energy management, resource planning and demand side management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. To understand power, hydrogen and carbon markets and green technology development. b. To explain the economics and technological principle of energy and carbon markets. c. To assess and discuss the roles and objective of energy and environment policies, as well as its implementation and development. d. To compare energy efficiency in different types of fuels and hence design management strategies on resources planning and demand side management. e. To communicate logically and lucidly through discussions and presentations.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction*:** Nature of different kinds of energy and power, overview of energy and carbon market, world energy consumption, carbon emission and environmental impact, energy needs of growing economy, long term energy scenario, energy supply infrastructure, carbon neutrality 2050 target. 2. ***Power, hydrogen and carbon market*:** Energy sector reform, deregulation of energy & electricity market, economics and technological principles for power, hydrogen and carbon market operations, power, hydrogen and carbon trading models: pool and bilateral contracts, market power and its mitigation, emission trading, energy risk management, financial hedging principles, electric power industry, ancillary services. 3. ***Energy and environment policies*:** Objective & roles of energy and environment policies, existing energy/renewable energy policy and environment policy in Hong Kong, China and overseas, its related laws, its implementation and its future development, comparisons of energy policies among developed countries, related policies for competition and sustainable development, the linkages between policy, planning and management. 4. Green technology and ***energy management*:** Concepts of green technology and energy management; comparisons of energy efficiency and environment impact of different types of fuels and modes of operations, introduction to integrated resource planning and portfolio, management (IRP & PM) for the right mix of generation types, transmission and conservation, demand side energy

management.

5. ***Energy and environment policies & Green technology case studies*:** Sharing and discussions on the real development cases of energy and environment policies and green technology in the world, Comparing and designing the new SCA in Hong Kong, renewable energy policy review and market design.

Teaching/Learning Methodology

The concept of energy policy and management will be presented through lectures and tutorials on local and international case studies. Students are expected to take initiative to learn through the process of engagement and participation in lectures and tutorial sessions. Students will be required to form groups to work through a mini-project for a selected topic. Mini-Projects are used to enhance students learning experiences and practical applications.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	✓	✓	✓	✓	
Tutorials	✓	✓	✓	✓	
Mini-projects		✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	✓	✓	✓	✓	
2. Class Test	15%	✓	✓	✓		
3. Essay Assignment	10%	✓	✓	✓	✓	
4. Mini-project & report	15%		✓	✓	✓	✓
Total	100%					

The subject outcomes on concepts, assessment and implementations of energy policy and management are evaluated by means of examination, quizzes and tests. The outcomes on practical applications and implementations of energy policy and management, as well as technical writing, are evaluated by essay assignment, mini-project and reports.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Mini-project discussion/Report/Essay	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	105 Hrs.

Reading List and References	**Reference books:** 1. D. Mulvaney, Green Technology: An A-to-Z Guide, SAGE Publications, 2011 2. F. Kreith and D.Y. Goswami, Energy Management and Conservation Handbook, Boca Raton: CRC Press, 2008 3. M. Chick, Electricity and Energy Policy in Britain, France and the United States since 1945, Cheltenham, Northampton, Mass: Edward Elgar, 2007 4. K. Mallon, Renewable Energy Policy and Politics: A Handbook for Decision-making, London, Sterling, VA: Eathscan, 2006 5. B.L. Capehart, W.C. Turner and W.J. Kennedy, Guide to Energy Management, Fairmont Press, New York: distributed by Dekker, 2003

December 2023

Subject Description Form

Subject Code	EEE525
Subject Title	Smart Transportation for Green Cities
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. Understand the concepts of smart transportation and its role in the sustainability of urban mobility systems. 2. Learn about various technologies and solutions enabling smart and green city transportation. 3. Evaluate how intelligent traffic management, public transit optimisation and shared mobility can reduce emissions and congestion.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand concepts of smart transportation technologies and strategies for sustainable urban mobility. b. Assess the role of data analytics and emerging technologies in optimising transportation systems for efficiency and environmental friendliness. c. Explore smart transportation systems' various components and technologies, such as intelligent traffic management and electric vehicles.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction to Smart Transportation and Green Cities:*** Definition and scope of smart transportation, importance and benefits of smart transport systems, and the concepts and principles of green cities and sustainable urban development 2. ***Data Collection and Data Analytics***: Introduction to the collection and analysis of transportation data, data sources, and big data analytics for optimising transportation systems. 3. ***Traveller Information Systems***: Understanding the benefits of providing information to travellers, including estimating and predicting travel times, smart parking technologies - availability information, and real-time passenger information. 4. ***Traffic management with ITS***: Applications of ITS in managing traffic on motorways and arterial roads, such as ramp metering, variable speed limits, lane usage management, electronic toll collection, public transport priority and incident detection. 5. ***Electric vehicle infrastructure***: electric and hybrid vehicles, alternative fuels, EV charging infrastructure and scheduling. 6. ***Shared Mobility Services:*** car sharing, bike/scooter sharing, ride-hailing/sharing apps, on-demand rides, and MaaS for reducing personal vehicle ownership. 7. ***Connected Autonomous Vehicles and Cooperative ITS***: The future of transportation with connected autonomous vehicles and the use of vehicle-to-

vehicle, vehicle-to-infrastructure, and vehicle-to-everything (V2X) communication to enhance safety and efficiency.

8. ***Autonomous Metros Infrastructure***: driverless metro trains and the supporting control systems, and operation of an autonomous mass transit system designed for GoA 4 (Grade of Automation Level 4) standards.

Teaching/Learning Methodology

Delivery of the subject is mainly through formal lectures and complemented by tutorials. The assignment provides students with hands-on experience in processing and analysing big data, while report-writing enables students to practise writing skills.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	✓	✓	✓
Tutorials	✓	✓	✓
Assignment			✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Mini Project	40%	✓	✓	✓
2. Continuous Assessment	20%	✓	✓	
3. Assignment	40%	✓	✓	✓
Total	100%			

The mini project allows assessment of outcomes covering principles, techniques, design and application, supplemented by continuous assessments. Assignments enable students to explore and apply data analytics and evaluate transport system performance.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Assignment	30 Hrs.
▪ Self-study	38 Hrs.
Total student study effort	107 Hrs.

Reading List and References

Reference books:

1. US DoT, ITS ePrimer, ITS Joint Program Office, www.pcb.its.dot.gov/eprimer/
2. PIARC, Cooperative Vehicle Highway Systems, Technical Committee 2.1 Road Network Operations, 2016.
3. R. Gordon, Intelligent Transportation Systems: Functional Design for Effective Traffic Management, Springer, 2016.

Subject Description Form

Subject Code	EEE5T03
Subject Title	Engineering Ethics and Academic Integrity
Credit Value	1
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of the subject are to: 1. Raise students' awareness of the importance of adhering high standards of academic integrity 2. Enhance students' ability to critically analyse ethical issues and make appropriate ethical decisions.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Demonstrate knowledge and understanding of the concepts and principles of academic integrity and ethics. 2. Demonstrate awareness and ability to analyse academic integrity and ethical issues, such as copyright and plagiarism, and act properly to avoid academic and ethical misbehaviours. 3. Recognise important ethical issues and practices in a university context. 4. Understand the implications and concerns on academic integrity raised by the latest technology, such as ChatGPT and other Generative Artificial Intelligence (GenAI) tools. 5. Identify and deal with complex ethical and professional issues in discipline-specific settings, and be able to communicate effectively the issues to the stakeholders and the public. 6. Critically analyse and discuss problem cases related to engineering ethics and academic integrity.
Subject Synopsis/ Indicative Syllabus	<u>Keyword Syllabus</u> • Introduction to engineering and research ethics – Needs for research ethics to the integrity and well-being of industry, professions, and community; overview of theories and methods in engineering and research ethics. • Ethical issues related to project collaboration, publication, and authorship – Responsibility for quality works; credit and responsibility of project collaborators; citation and acknowledgment; qualifications for authorship; engineering case studies. • Professional and research misconduct – Definition of professional and research misconduct; self-deception in misconduct; factors that undermine integrity; understanding and fostering responsible conduct; engineering case studies. • Involving human subjects and animals – The common rule for the protection of human subjects in research and professional functions; responsibility for

<table>
<tr><td></td><td>experimental animals; requirements governing research and professional functions involving human subjects and animals; engineering case studies.
• Rights and responsibilities regarding intellectual property – Individual credit and the ownership of innovation; copyrights, “Fair Use,” and the Digital Millennium Copyright Act; patents and trade secrets; property rights contrasted with credit for invention; patenting of inventions contrasted with publication of project result; engineering case studies.
• Cyber ethics – Common threats to information and systems in the cyberspace; core values of cybersecurity: privacy, security, fairness, and accountability; potential value conflicts and solutions; ethical hacking and concerns; legislative framework: EU Da ta Protection Regulation; engineering case studies.
• Ethical use of Generative AI – AI ethics; introduction of Generative AI and its ethical considerations in engineering research and professional functions; AI hallucination; technical efforts in fake, bias, and plagiarism identification; ethical responsibility of developers using generative AI; regulating generative AI and the AI Act; engineering case studies.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>• Lectures: Formal classroom lectures will be given to introduce the concepts of engineering research ethics. Core principles of ethics will be illustrated with engineering cases. They support the intended learning outcomes 1 to 5. Since all lectures are important, <u>students need to achieve 100% attendance in the lectures to pass the subject.</u>
• Group discussions and quizzes: During the lecture, students will form groups to analyse and discuss various engineering ethics cases related to the topic of the lecture. Students also need to complete an online quiz after the lecture to show their understanding of the teaching material. They support the intended learning outcomes 1 to 6.
• Case study and reflection: Students need to choose one of the problem cases in engineering ethics and academic integrity for in-depth analysis. The analysis result will be shared with other students in a presentation session. Students also need to analyse an ethical problem related to their research project/field of professional work for the reflective study. They support the intended learning outcomes 1 to 6.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>1. Quizzes</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Case study - Presentation</td><td>40%</td><td>✓</td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>3. Reflective writing</td><td>40%</td><td>✓</td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>

This subject will be assessed on a pass/fail grading system and will not be included in the GPA calculation. To pass the subject, students need to attend all lectures and score 50% or higher in the total marks.

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

Quizzes: Students will complete an online quiz after each lecture to show their understanding of the teaching material. They assess the intended learning outcomes 1</td></tr>
</table>

	to 5. Case study presentation: The best way to learn engineering ethics and academic integrity is to analyse previous problem cases so that students can learn the lessons from them. A presentation session will be arranged for students to share with other students their analysis results. It assesses the intended learning outcomes 1, 5, and 6. Reflective writing: To assist students to sink in the discussion in the classes, they are required to submit a reflective report to detail their analysis of an ethical problem related to their research project/field of professional work. It assesses the intended learning outcomes 1, 5, and 6. The reflective writing assignment submissions will be marked by students' supervisors adopting a holistic approach.	
Student Study Effort Expected	Class contact:	
	▪ Lecture and class activity	13 Hrs.
	Other student study effort:	
	▪ Self-study and group work	12 Hrs.
	▪ Assignment preparation	10 Hrs.
	Total student study effort	35 Hrs.
Reading List and References	1. Caroline Whitbeck (2011). *Ethics in Engineering Practice and Research*, Cambridge University Press. 2. Lance Eliot (2023). *Generative AI ChatGPT And AI Ethics*, Lance B. Eliot. 3. Markus Christen, Bert Gordijn, and Michele Loi (2020). *The Ethics of Cybersecurity*, Cham: Springer. 4. Kristin Shrader-Frechette (1994). *Ethics of Scientific Research*, Lanham, Md.: Rowman & Littlefield. 5. University of California, San Diego (UC San Diego). *Resources for Research Ethics Education*, http://research-ethics.net.	

ANNEX

DISSERTATION

GUIDELINES AND ASSESSMENT

Operational Guidelines on Dissertation

1. INTRODUCTION

The dissertation is a very significant component of a Master programme. It carries a weight equivalent to three taught subjects and represents around 315 – 345 hours of student effort. Since students usually continue with their jobs while they work on their dissertations, the subject of the dissertation is preferably related to the student's employment.

The dissertation should be an exposition of a student's own work and ideas. Where others have had an input (e.g. in a team situation) this should be clearly identified. Plagiarism is unacceptable. Expulsion may be imposed in cases of proven plagiarism (See *Annex-Pages 18 to 20*).

Though the subject areas of dissertations are so diverse it is impossible to define a standard approach to carry out the dissertation, its content should include an introduction and definition of objectives, a literature survey, a review of the problem followed by a description of the student's approach to solving the problem, the results or findings, an intellectual analysis of the results or findings, and finally a logical review of the conclusions drawn.

Students are encouraged to initiate dissertation topics relating to their employment. However, students may take up campus based dissertations in cases of difficulty.

2. THE DISSERTATION PROCESS: PREPARATION, PROGRESS AND ASSESSMENT

The procedures for preparing a dissertation can be divided into three different stages.

2.1 Proposal

2.1.1 The student will prepare a dissertation proposal in a standard format using a synopsis form (Form EEE-125 attached) in consultation with his academic supervisor. This standard form can be downloaded from the web.

2.1.2 Students are expected to submit their dissertation proposal to the Departmental Postgraduate Programme Committee for approval no later than week 10 of the semester in which the student first register for dissertation.

2.1.3 Regulations concerning dissertation registration

2.1.3.1 Once a dissertation proposal is approved the student shall proceed at once to carry out the work.

2.1.3.2 Students should be aware that approval to commence a dissertation is by no means automatic. There will be cases where a student is not permitted to proceed with a dissertation and therefore such students will be required

to leave the programme on completion of the requirements for a Postgraduate Diploma award.

2.1.3.3 Students can register on dissertations only if they are co-taking and/or have taken a total of 3 taught subjects (including credit transferred subjects) in that semester. The normal period for completion of a dissertation is 3 semesters. Students are required to pay for all of the 9 credits the dissertation carries in the first semester when he/she enrols on the dissertation. Fees paid will not be refunded even if the student withdraws from his/her dissertation during the course of his/her registration. The registration period for the dissertation is set at a maximum of 4 semesters from the date of registration, subject to the regulations on the normal duration for completion of a programme and subject to satisfactory reports on progress from the academic supervisor. The minimum period for the dissertation work to be completed is 2 semesters. Break of study is normally not permitted once a student registers for dissertation and students are expected to pursue their dissertation in consecutive semesters.

2.1.3.4 Subject to satisfactory reports on progress from the academic supervisor, students whose dissertation proposal has been approved will continue to register on their dissertation until either the completion of their dissertation or the normal dissertation registration period expires.

2.1.3.5 The student should plan to submit the completed dissertation well before the final deadline and at least several months before the end of the normal period.

2.2 Progress Reports

2.2.1 Students are expected to submit a progress report (Form EEE-126 attached) to the Departmental Postgraduate Programme Committee via their academic supervisor at least once every semester to ensure smooth progress of the dissertation.

2.2.2 Students should inform their academic supervisors immediately when difficulties arise.

2.3 Early Warning

Upon request from the Departmental Postgraduate Programme Committee, a student who fails to progress to his academic supervisor's satisfaction will receive a warning letter from the Department.

2.4 Submission of Dissertation before Assessment

2.4.1 Under normal circumstances, with the agreement of the supervisor(s), students may prepare for assessment after satisfactory progress.

2.4.2 Students should submit the dissertation together with a Dissertation Submission Form (Form EEE-127 attached) to the academic supervisor one month prior to the end of the semester.

2.5 Assessment

2.5.1 Oral examination

After submission of the dissertation for assessment, the academic supervisor shall make arrangements with the assistance of the Department on a mutually convenient time and place for an oral exam at which the other assessor(s) will be present.

2.5.2 Assessment panel

The assessment panel will consist of two categories of members, namely:

2.5.2.1 the supervisors (academic supervisor, and professional supervisor if relevant); and

2.5.2.2 a second assessor who is a subject expert from the Department, from another department in the University, or from industry, to be appointed by the Programme Leader.

2.5.3 Regulations concerning dissertation assessment

2.5.3.1 The date set for the oral examination shall allow sufficient time for the examiners to read the submission and should normally be no later than one month after submission of the dissertation.

2.5.3.2 After conducting the oral examination, the assessment panel will jointly allocate a grade guided by the following weightings which may vary depending on the nature of the project.

Progress 20%	Report 50%	Oral 30%	Total 100%

2.5.3.3 After the assessment of the dissertation is complete the academic supervisor shall write a report on the outcome using a standard outline report form. This report must be signed by all who participated in the assessment of the dissertation and be forwarded to the Departmental Postgraduate Programme Committee.

2.5.3.4 The report shall contain a date by which the student should submit his final dissertation and the number of hard and electronic copies required to the host Department which would arrange to send an electronic copy to the Library. The deadline for submission of the report of the assessment panel to the Departmental Postgraduate Programme Committee is TWO WEEKS before the meeting of the Subject Assessment Review Panel.

2.5.3.5 Department could at its discretion allow students to complete their dissertations during the summer break. In such cases these results could be processed by the Subject Assessment Review Panel held for the summer semester to allow students to graduate.

2.5.3.6 Applications to defer submission should NOT normally be considered or approved except under exceptional circumstances such as illness. In such cases, students' applications for deferment of study can be considered.

2.5.3.7 If a student wishes to delay the submission of the completed dissertation beyond the normal period but within the maximum period of 4 semesters, he/she may apply on the advice of the supervisor with valid supporting document(s). The application must be approved by the Departmental Postgraduate Programme Committee.

2.5.3.8 When permission is granted to extend the dissertation registration beyond the normal period, the student shall be required to pay a fee which is set out in the Student Handbook, which shall entitle him/her to register for one additional semester.

3. DISSERTATION SUPERVISION

The amount of effort required by students in the dissertation should clearly be reflected in the quantity and quality of the final submission. In assessing the standard of dissertations, supervisors will be seeking to ensure that the student has met the aims of this part of the programme.

3.1 Academic Supervisor

3.1.1 The student and academic supervisor should contact each other from time to time to discuss progress against his/her agreed programme. The responsibility for arranging meetings between student and academic supervisor is shared by both parties.

3.1.2 The academic supervisor will provide guidance to complement that available within the student's employing organisation and advises the student about the style of presentation of the dissertation. If a professional supervisor has been appointed, the academic and professional supervisors will liaise as circumstances require. The academic supervisor will be available for consultation on a regular basis both at the University and at the student's workplace according to circumstances.

3.2 Professional Supervisor (optional)

3.2.1 The role of the professional supervisor is to be able to assess the student's effort in the workplace and assist in the conduct of the oral examination and provide assurance that the candidate's work has been independently done. Students should approach a prospective professional supervisor and explain their requirements and should obtain his/her agreement to act as professional supervisor.

3.2.2 If the work for the dissertation forms part of a group endeavour within the student's organisation, it is essential that the student's personal contribution can be identified and that the professional supervisor can speak for the part which the student has played.

4. FORMAT AND PRESENTATION OF DISSERTATION

4.1 Each copy of a dissertation must be typewritten in double or one-and-a-half lines spacing on International-size-A4 paper, except for drawings, maps, or tables, for which there are no restrictions. The electronic copy should follow the same page set up and spacing specification.

4.2 A dissertation should contain the following parts, each starting on a new page, in the following order:

4.2.1 A cover page

DISSERTATION TITLE *(all capitalised)*

STUDENT NAME (*all capitalised)*

MSc in XXX

The Hong Kong Polytechnic University

Year of Award

4.2.2 A title page

The Hong Kong Polytechnic University

Name of Department

Dissertation Title

Student Name

A dissertation submitted in partial fulfillment of the requirements

for the MSc in xxx

the month and year of the initial
submission

4.2.3 A Certificate of Originality

CERTIFICATE OF ORIGINALITY

I hereby declare that this dissertation is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

_____ (Signed)

_____(Name of student)

4.2.4 Dedication (optional)

4.2.5 Abstract
- Consisting of a summary of the work done with 200-500 words.

4.2.6 Publications arising from the dissertation (optional)
- Follow the format described in Paragraph 4.5 below.

4.2.7 Acknowledgements

4.2.8 Table of contents

4.2.9 List of figures, tables and abbreviations (all optional)

4.2.10 Chapter 1 : Introduction (the subtitles for all chapters are to be decided by the students)

4.2.11 The dissertation body

4.2.12 Conclusions and Suggestions for Future Research (the latter being optional).

4.2.13 References

- The references for all chapters can be placed at the end, or those for each chapter can be placed at the end of the chapter.
- References should be presented in alphabetical order of the first author, using the reference citation format for academic journal papers, book chapters, conference papers, research reports/working papers and books/research monographs, or in an internationally accepted format used by the discipline in which the study lies.

4.3.1 Intellectual property created by students in the course of their study at the University shall be owned by the University only if the student receives financial support from the University in the form of wages, salary or stipends for undertaking their study or research in the University; makes material use of the University's resources for his/her research work; receives material guidance and intellectual input from the University's staff for his/her research work; or if his/her research work is funded by a grant to the University or to him/her by virtue of his/her employment by the University.

4.3.2 Generally speaking, intellectual property rights, among other things, refers to novel information and ideas that the law protects. It means the material or communicable result of scientific, humanistic, literary, and artistic effort. It includes, but is not limited to, works in the forms of copyrights, designs, inventions, discoveries, trademarks, formulae, processes, computer software, drawings and sculptures, journal articles, and conference presentations. Students should not, therefore, make the claim that they own the intellectual property of the research work in their dissertation or in other publications that resulted from their research work.

4.4 Each copy of the dissertation submitted for examination purpose should include the words 'Initial Submission for Examination Purpose' lettered on the front cover.

4.5 The approved dissertation should be submitted in electronic format and must be prepared in accordance with the following requirements:

File format	PDF format Compatible with PDF version 1.4 (Acrobat 5) or higher Must be text-searchable Image PDF is not acceptable
Paper size	A4 (210 x 297 mm), except for drawings, maps or tables
Security	No password assigned and all security settings should be turned off
Font	All fonts must be embedded
Spacing	Must be double or one-and-a-half lines

.

The electronic version must be clear enough that it presents all images, data and symbols.

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Form EEE-125

Department of Electrical and Electronic Engineering

Synopsis

Dissertation Proposal for MSc in _____

This form should be typewritten. All sections should be completed in full. Sections 1-3 are to be completed by the student. In signing this form the Departmental Postgraduate Programme Committee confirms that the student is registered on dissertation, the proposal is of an acceptable academic standard and that the university resources necessary for the dissertation will be made available. The completed form should be sent to the Departmental Postgraduate Programme Committee for approval no later than week 10 in each semester.

Section 1 : Student Details

Student's Name : Student No. :

Tel No. : Email address. :

Subjects taken so far (include title, grade, and academic year for all subjects for which a grade has been obtained)

Section 2 : Supervisor Details

Academic Supervisor's Name, Qualifications and Department :

Professional Supervisor's Name, Qualifications, Position, and Affiliation (appointment of which is optional) :

Professional Supervisor's Address :

Tel. No. : Email address. :

Section 3 : Details of Dissertation Topic

Dissertation title :

Signature of student : Date :

Section 4 : Comments of Academic Supervisor

The proposed dissertation topic is considered pertinent to the specialism of (please tick as appropriate):

A list of specialisms offered will be listed for selection.

☐ Not applicable

Signature : Date :

Section 5 : Comments of Professional Supervisor, if any

Signature : Date :

Section 6 : Decision of Departmental Postgraduate Programme Committee

Approved/Referred back for improvement/Rejected

Signature : Date :

Chairman, DPPC

Objectives of the Project

Content

(Innovative features, challenge, academic value and applicability of the project)

(Cont'd)

Methodology

References

Scheduled programme of work

Description of facilities required and justification

(Also detail any other supporting facilities obtained elsewhere)

Expected completion date :

Student's Signature

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Form EEE-126

Department of Electrical and Electronic Engineering

Dissertation Progress Report

This report is to be completed by the student then endorsed by the academic supervisor who will forward it to the Departmental Postgraduate Programme Committee every semester.

Section 1 : To be Completed by Student

Student's Name :_____ Student no. _____

MSc in

_____

Academic Supervisor's Name :

_____

Dissertation Title :

_____

Start Date : _____ Expected Completion Date : _____

Student's report

Briefly describe progress since last report (or since commencement):

Please explain any problems you have identified and suggest appropriate action :

Signed : _____ Date : _____

Section 2 : To be Completed by Academic Supervisor

Academic Supervisor's comments

Progress is generally satisfactory / unsatisfactory*

The proposed dissertation topic is considered pertinent to the specialism of (please tick as appropriate):

A list of specialisms offered will be listed for selection.

☐ Not applicable

Comments :

Signed : _____ Date : _____

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Form EEE-127

Department of Electrical and Electronic Engineering

Dissertation Submission Form

Section 1 : To be completed by student

Students' Name : Student No.:

MSc in :

Proposed Dissertation Title :

Name and department/company of academic, and professional supervisor (if any):

Signature : Date :

Section 2 : To be completed by Academic Supervisor

Please tick as appropriate:

- □ I agree that the dissertation is ready for submission.
- □ I do not agree that the dissertation is ready for submission. My specific views on the shortcomings have been made known to the student.
- □ I am satisfied with the title proposed by the student.
- □ I have amended the title proposed by the student as shown above.
- □ The proposed/amended dissertation topic is considered pertinent to the specialism of *(please choose from below):*

A list of specialisms offered will be listed for selection.

□ Not applicable

Signature : Date :

Section 3 : To be completed by Chairman of Departmental Postgraduate Programme Committee

The Departmental Postgraduate Programme Committee has nominated _____

as the assessor for this dissertation (optional if a professional supervisor is present).

Signature : Date :

About Plagiarism

Students should refer to the Student Handbook for details
https://www.polyu.edu.hk/ar/docdrive/polyu-students/student-

Plagiarism refers to the act of using the creative works of others (e.g. ideas, words, images or sound, etc) in one's own work without proper acknowledgement of the source. According to the Webster's Ninth New Collegiate Dictionary (1987), to 'plagiarise' means

> [T]o steal and pass off (the ideas or words of another) as one's own : [to] use (a created production) without crediting the source : [to] commit literary theft : [to] present as new and original an idea or product derived from an existing source.

The University views plagiarism, whether committed intentionally or because of ignorance or negligence, as a serious disciplinary offence. Excuses such as "not knowing that this is required" or "not knowing how to do it" will not be accepted. It is the student's responsibility to understand what plagiarism is, and take action steps to avoid plagiarism in their academic work. The golden rule is: "if in doubt, acknowledge".

Avoiding Plagiarism

Students are required to submit their original work and avoid any possible suggestion of plagiarism in the work they submit for grading or credit. Below are some suggestions on how you can avoid plagiarism in your own work:

Use sources with care and respect

- Take careful notes so that you know where you got your information.
- Keep track of all the sources you have used for each assignment.
- Cite all your sources in your finished work, distinguishing carefully between your own ideas/work and those taken from others.
- Include all your sources in your Reference or Bibliography section, normally included at the end of the paper.

Find out the expectations of your teacher

- Different disciplines or professions may have slightly different conventions for citation and referencing. Ask your teacher for the specific citing and reference system or conventions used in your chosen profession/discipline.
- Ask your teacher what types of collaborations and help are permitted for the specific assignment.

Develop your academic skills

- Plan your academic work carefully and start early so that you have time to do your own work.
- Make a work schedule for your work and try to keep to it.

- Study resource materials and attend courses or workshops provided by the University to continually improve your skills in referencing and academic writing.

Be honest, and always do your own work

- Do not attempt to disguise copying from sources, for example, by translating from sources in another language or changing some words of a copied text. Proper referencing is required.

- Do not quote, summarise or paraphrase from sources that you do not fully understand. Always be able to explain what the source means and why it is relevant.

Resources and Support Provided to Students

To know more about plagiarism and how to cite sources properly in your work, please refer to the booklet "Student Guide on Academic Integrity" developed by the University at https://www.polyu.edu.hk/ous/docdrive/Academic_Integrity/Student_Guide.pdf

You can also obtain more information about using sources and referencing styles from the following web page of the Centre for Independent Language Learning, English Language Centre of this University at https://elc.polyu.edu.hk/CILL/reference.aspx.

The University Library subscribes to EndNote. It is a reference management tool that could be used to help you create your own bibliographic database. More details can be found at: https://libguides.lb.polyu.edu.hk/ref-mgt-tools/endnote

The University's Policy on promoting academic integrity

1. Academic integrity is the foundation of any academic endeavour of a university, and is valued highly at PolyU. It is therefore the responsibilities of all members of the University, including both staff and students, to ensure that they pursue their scholarly work in an academically honest manner.

2. The purpose of this policy on promoting academic integrity is to nurture among students responsible and ethical attitudes towards their academic work. More specifically, it attempts to:

    - Educate students about the importance of originality, honesty, integrity and personal responsibility in academic pursuits and scholarly work;

    - Provide guidelines and tools for academic staff to detect cases of suspected plagiarism, and take necessary actions;

    - Provide opportunities for students to develop their ability to produce work that is plagiarism-free.

3. All academic staff are expected to actively monitor students' work for incidents of suspected plagiarism, using methods – including electronic detection – that are most suited for the context. They can, wherever they deem appropriate, require students to send any text-based assignments for electronic plagiarism check when/before submitting them for assessment.

4. Students of taught postgraduate and research postgraduate programmes must send their theses or dissertations for electronic plagiarism check, and revise the work if necessary, before submitting the work formally for examination. The respective Chief Supervisors are responsible for making sure that their students have complied with this requirement before sending their theses/dissertations to the Internal and/or External Examiners, and advising their students on how to revise their work to conform to the academic conventions of their discipline/profession.

All publications (e.g. conference paper or journal articles) produced by students and research personnel bearing the name of PolyU must also be sent for electronic plagiarism check, and subsequently revised if necessary, before submission to the relevant bodies (e.g. conference organisers or journal editors) for review for publication. Where appropriate, the overseeing academic staff are responsible for ensuring compliance of students/research personnel with this requirement.