THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of
MECHANICAL ENGINEERING
機械工程學系

Master of Science in Mechanical Engineering

(Mixed mode)

Programme Requirement Document

September 2024

Contents

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

[This Programme Requirement Document is posted at https://www.polyu.edu.hk/me/study/course-info/]

For ease of reading only the masculine pronoun has been used throughout this booklet. Women staff members and students should not take the omission of 'she', 'her' or 'hers' as being other than an editorial convenience.

PART A PROGRAMME INFORMATION

1. GENERAL INFORMATION

1.1 Programme Information

Programme Title (Code)	Master of Science in Mechanical Engineering (43100)
Host Department	Department of Mechanical Engineering
Programme Structure	Credit-based
Mode of Attendance	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 the University's services.)*
Duration of Study*	**Full-time**: 1.5 years (3 semesters) **Part-time**: 2.5 years (5 semesters)
Award Title	Upon successful completion of the required content of the respective awards, students will graduate with a Master of Science Degree (MSc). The following awards *(specialism study options in brackets)* are offered*:* • MSc in Mechanical Engineering • MSc in Mechanical Engineering *(Aerospace Engineering)* • MSc in Mechanical Engineering *(Air/Noise Pollution Management)* • MSc in Mechanical Engineering *(Green Energy)* • MSc in Mechanical Engineering *(Product Development and Analysis)* *Note: Students may apply to exit the MSc programme with a Postgraduate Diploma (PgD), subject to meeting the specified requirements.*
Medium of Instruction	English
Credit Fee	HK$6,100 per credit for local and non-local students

** Notes for Duration of study*

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

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/School Board Chairman.

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

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

1.2 Entrance Requirements

General Entrance Requirements

- A Bachelor's degree with Honours in a relevant branch of engineering, or a related applied science discipline; OR
- Qualifications that satisfy the academic requirements for Corporate Membership of the mechanical discipline of the Hong Kong Institution of Engineers (HKIE), or the equivalent.

Consideration will also be given to candidates without Honours degrees who have other relevant qualifications and/or appropriate work experience.

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 fulfil the following minimum English language requirement:

(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.

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

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

1.3 Summer Term Teaching

The Programme does not have a mandatory Summer Term.

1.4 Daytime and Evening Teaching

Subjects will be offered predominately in the evenings/on weekends. Some subjects may be made available in the daytime. Classes can also be arranged with such alternatives as full-time weekends or full-time weekdays. In general, each subject requires a 3-hour class per week over a 13-week semester.

2. OBJECTIVES AND INTENDED LEARNING OUTCOMES

2.1 Programme Aims

a) To provide advanced education and training for students who intend to upgrade their knowledge and seek a higher-level career in the area of Mechanical Engineering;

b) To enable students to develop their competence to increase their competitiveness in the job market and become the backbone in industry;

c) To enable students to have good understanding and mastering of the most up-to-date advanced technologies in the area of Mechanical Engineering; and

d) To enable students to apply their learned knowledge and skills to solve problems encountered in practice.

2.2 University Mission

The PolyU mission and the relationship with the programme intended learning outcomes are giving below:

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.

The following table illustrates the relationship between programme aims and University mission:

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

2.3 Institutional Learning Outcomes

The institutional learning outcomes for the 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 practice.

2.4 Intended Learning Outcomes of the Programme

The programme has the following intended learning outcomes:

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

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

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

2.5 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)**	**(d)**
(a)	√	√	√	√
(b)	√	√	√	√
(c)		√		√

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

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

3. PROGRAMME STRUCTURE AND CURRICULUM

3.1 Award Requirements

Students are required to complete the following required credits for the following awards (specialism study options):

Award (Specialism)	Dissertation option	Non-dissertation option
MSc in Mechanical Engineering	Complete **SEVEN** taught subjects and a 9-credit dissertation. For an award in a designated area, a minimum of **FOUR** taught subjects shall be core subjects specified for the relevant area and the dissertation topic shall be pertinent to the area.	Complete **TEN** taught subjects. For an award in a designated area, a minimum of **SIX** subjects shall be core subjects specified for the relevant area.
MSc in Mechanical Engineering (Aerospace Engineering)	Complete **SEVEN** taught subjects, including **THREE** compulsory and at least **ONE** core subject specified for the specialism of Aerospace Engineering, and a 9-credit dissertation and the dissertation topic shall be pertinent to the specialism.	Complete **TEN** taught subjects, including **THREE** compulsory and at least **THREE** core subjects specified for the specialism of Aerospace Engineering.
MSc in Mechanical Engineering (Air/Noise Pollution Management)	Complete **SEVEN** taught subjects and a 9-credit dissertation. A minimum of **FOUR** taught subjects shall come from the core subject list specified for the specialism of Air/Noise Pollution Management and the dissertation topic shall be pertinent to the specialism.	Complete **TEN** taught subjects. A minimum of **SIX** subjects shall come from the core subject list specified for the specialism of Air/Noise Pollution Management.
MSc in Mechanical Engineering (Green Energy)	Complete **SEVEN** taught subjects and a 9-credit dissertation. A minimum of **FOUR** taught subjects shall come from the core subject list specified for the specialism of Green Energy and the dissertation topic shall be pertinent to the specialism.	Complete **TEN** taught subjects. A minimum of **SIX** subjects shall come from the core subject list specified for the specialism of Green Energy.
MSc in Mechanical Engineering (Product Development and Analysis)	Complete **SEVEN** taught subjects and a 9-credit dissertation. A minimum of **FOUR** taught subjects shall come from the core subject list specified for the specialism of Product Development and Analysis and the dissertation topic shall be pertinent to the specialism.	Complete **TEN** taught subjects. A minimum of **SIX** subjects shall come from the core subject list specified for the specialism of Product Development and Analysis.

Students may apply to exit the MSc programme with a Postgraduate Diploma (PgD), subject to meeting the specified requirements listed in the follow:

PgD Exit Awards	Requirements
PgD in Mechanical Engineering	Complete **SIX** taught subjects. For an award in a designated area, a minimum of **FOUR** taught subjects shall be core subjects specified for the relevant area.
PgD in Mechanical Engineering (Aerospace Engineering)	Complete **SIX** taught subjects, including **THREE** compulsory and at least **ONE** core subject specified for the specialism of Aerospace Engineering.
PgD in Mechanical Engineering (Air/Noise Pollution Management)	Complete **SIX** taught subjects. A minimum of **FOUR** subjects shall come from the core subject list specified for the specialism of Air/Noise Pollution Management.
PgD in Mechanical Engineering (Green Energy)	Complete **SIX** taught subjects. A minimum of **FOUR** subjects shall come from the core subject list specified for the specialism of Green Energy.
PgD in Mechanical Engineering (Product Development and Analysis)	Complete **SIX** taught subjects. A minimum of **FOUR** subjects shall come from the core subject list specified for the specialism of Product Development and Analysis.

Besides the above subject requirement, students are also required to satisfies all the conditions listed for graduation:

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

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

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

(d) Having fulfilled the Academic Integrity and Ethics Requirement (AIE) (see below); and

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

Academic Integrity and Ethics (AIE) Requirement

Students 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 programme host 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

Students enrolled on taught postgraduate programmes are required to complete the National Education (NE) Requirement. It is a 3-hour online module plus 7 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/.

3.2 List of Core and Elective Subjects

Award Title	Compulsory/Core Subjects
MSc in Mechanical Engineering	*Core subjects:* ME534 ME536 ME548 ME552 ME556 ME558 ME559 ME566 ME567 ME569 ME570 ME571 ME572 ME573 ME574 ME576 ME577 ME578 ME579 ME5201 ME5202 ME5203 ME5205 ME5206 ME5207* ME5510* ME5610*
MSc in Mechanical Engineering (Aerospace Engineering)	*Compulsory subjects:* ME576 ME577 ME578 *Core subjects:* ME548 ME556 ME558 ME567 ME579 ME5203 ME5510*
MSc in Mechanical Engineering (Air/Noise Pollution Management)	*Core subjects:* ME534 ME536 ME556 ME559 ME574 ME5202 ME5203 ME5510* ME5610*
MSc in Mechanical Engineering (Green Energy)	*Core subjects:* ME556 ME5201 ME5202 ME5203 ME5205 ME5206 ME5207* ME5510*
MSc in Mechanical Engineering (Product Development and Analysis)	*Core subjects:* ME548 ME552 ME558 ME570 ME571 ME572 ME573 ME574 ME5510* ME5610*

** Subjects retitled effective from Semester 2 of 2023-24:*

1) *From ME557 CFD and Thermofluid System Design to ME5510 Thermal Engineering;*
2) *From ME564 Principles and Design of Air Pollution Control Devices to ME5610 Air Pollution Engineering; and*
3) *From ME5204 Batteries and Capacitors to ME5207 Electrochemical Energy Conversion Materials and Devices.*

3.3 Curriculum Mapping

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

Compulsory/Core Subjects	Intended Learning Outcomes		
	(a) Professional competence	(b) Critical & creative thinking	(c) Lifelong learning capability
ME534 Engineering Acoustics	√	√	√
ME536 Vibration and Structure-borne Noise	√	√	√
ME548 Computer Aided Product Analysis	√	√	√
ME552 Integrated Engineering Design	√	√	√
ME556 Advanced Combustion Systems	√	√	√
ME558 Advanced Materials and Structural Design	√	√	√
ME559 Advanced Environmental and Transportation Noise Control	√	√	√
ME566 Industrial and Environmental Measurement Technology	√	√	√
ME567 Advanced Control Technology	√	√	√
ME569 Thermal System Design and Management	√	√	√
ME570 Advanced Product Mechatronics	√	√	√
ME571 Corrosion Control	√	√	√
ME572 Design for Sustainable Development	√	√	√
ME573 Project on Product Design and Management	√	√	√
ME574 Product Noise Control	√	√	√
ME576 Turbulent Flows and Aerodynamics	√	√	√
ME577 Advanced Aircraft Structures	√	√	√
ME578 Aircraft Design	√	√	√
ME579 Aircraft Noise and Aeroacoustics	√	√	√
ME5201 Hydrogen and Fuel Cells	√	√	√
ME5202 Solar and Wind Engineering	√	√	√
ME5203 Green Combustion	√	√	√
ME5205 Advanced Energy Storage Technologies	√	√	√
ME5206 Advanced Materials for Clean Energy	√	√	√
ME5207 Electrochemical Energy Conversion Materials and Devices	√	√	√
ME5510 Thermal Engineering	√	√	√
ME5610 Air Pollution Engineering	√	√	√

3.4 Dissertation and Dissertation Assessment

Academic supervisors, and professional supervisors (optional) are appointed by the Departmental Postgraduate Programme Committee. Students are expected to submit a dissertation proposal to the Departmental Postgraduate Programme Committee no later than the last teaching day of the semester in which they first register for the dissertation.

Students can register for dissertations only if they have taken a total of 3 taught subjects (including credit-transferred subjects) in that semester. Students are required to pay for all of the 9 credits the dissertation carries in the first semester when they enroll in the dissertation. Fees paid will not be refunded even if students withdraw from the dissertation or the programme during the course of their registration. They will be required to complete their dissertations within the normal period of 3 semesters. The minimum period for the dissertation work to be completed is 2 semesters. Those who are not able to complete their dissertation

may apply on the advice of the supervisor to the Departmental Postgraduate Programme Committee for approval to extend the dissertation registration beyond the normal period but within the maximum period of 4 semesters. Applications for extension beyond the normal period will be considered by the Departmental Postgraduate Programme Committee and approved only under exceptional circumstances.

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

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

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

a) the supervisors (academic supervisor, and professional supervisor if relevant); and
b) a second assessor who is a subject expert from the department, from another department in the University, or industry, to be nominated by the Departmental Postgraduate Programme Committee.

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

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

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. Individual awards may modify key items and the recommended weightings according to the needs of each award.

Progress 20%	**Dissertation 50%**	**Oral 30%**	**Total 100%**

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

The report will 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 examination report to the Departmental Postgraduate Programme Committee is TWO WEEKS before the meeting of the Subject Assessment Review Panel (SARP).

The Department could at her discretion allow students to complete their dissertations during the summer break. In such cases, these results could be processed by the SARP held for the summer semester to allow students to graduate.

A set of operational guidelines on the dissertation is attached in the *Annex.*

4. ACADEMIC REGULATIONS AND ASSESSMENT

The academic regulations described below are based on the information known as of April 2024. They are subject to review and changes from time to time. Students will be informed of the changes as and when appropriate. **Important information relating to students' study is also published in the Student Handbook (https://www.polyu.edu.hk/ar/students-in-taught-programmes/student-handbook/).**

4.1 Plagiarism and Bibliographic Referencing

The University views plagiarism and copying of copyright materials, without the licence of the copyright owner, as a serious disciplinary offence. The notes in the "Appendix 3. Plagiarism" section of the Student Handbook (https://www.polyu.edu.hk/ar/students-in-taught-programmes/student-handbook/) aim to help students comply with the University's policy on plagiarism in continuous assessment, bibliographic referencing and photocopying of copyright materials. For details, please refer to:
https://www.polyu.edu.hk/ous/docdrive/Academic_Integrity/Student_Guide.pdf

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" are not 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".

4.2 Subject Registration and Withdrawal

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 programme offering department and will require the approval of both the subject teacher and the host department Programme Leader concerned (or an alternate academic staff authorised by the programme offering Department). Applications submitted after the commencement of the examination period will not be considered. 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.

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.

For the information on the pre-requisite requirements, if applicable, please refer to the respective syllabus listed in Part B.

4.3 Study Load

For students following the progression pattern specified for their programme, they have to take the number of credits and subjects, as specified in the Programme Requirement Document, for each semester.

The normal study load is 15 credits in a semester for full-time study. The maximum study load to be

taken by a student in a semester is 21 credits, unless exceptional approval is given by the Head of the programme offering Department (or his/her delegates). For such cases, students should be reminded that the study load approved should not be taken as grounds for academic appeal.

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

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

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

Students enrolled on mixed-mode programmes are required to take 9 credits or more in a semester in order to retain full-time status. Otherwise, they will be given a part-time status.

4.4 Subject Exemption

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. 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. It will therefore be necessary for the students to consult the programme offering department and take another subject in order to satisfy the credit requirement for the award.

4.5 Credit Transfer

Students may be given credits for recognised previous studies; and the credits will be counted towards meeting the requirements for award/degree *(Credit transfer from undergraduate studies to postgraduate studies will be allowed on the condition that these credits were on top of the baccalaureate requirements.)* Transferred credits may not normally be counted towards more than one award. The granting of credit transfer is a matter of academic judgment.

Credit transfer may be done with or without the grade being carried over; the former should normally be used when the credits were gained from PolyU. Credit transfer with the grade being carried over may be granted for subjects taken from outside the University, if deemed appropriate, and with due consideration to the academic equivalence of the subjects concerned and the comparability of the grading systems adopted by the University and the other approved institutions. Subject credit transfer is normally decided by the subject offering Department. However, for applications which are submitted by students who have completed an approved student exchange programme, the decision will be made by the programme offering Department in consultation with the subject offering Departments.

The validity period of credits previously earned, is 8 years after the year of attainment. Normally, not more than 50% of the credit requirement for award may be transferable from approved institutions outside the University. For transfer of credits from programmes offered by PolyU, normally not more than 67% of the credit requirement for award can be transferred. In cases where both types of credits

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

All credit transfers approved 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 that semester (even if the granting of credit transfer will immediately enable the student to satisfy the credit requirement for the award).

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.

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.

4.6 Deferment of Study

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

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

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.

4.7 General Assessment Regulations

Students progress by credit accumulation, i.e. credits earned by passing individual subjects can be accumulated and counted towards the final award.

A 'level' in a programme indicates the intellectual demand placed upon students and may characterise each subject with respect to its recommended sequencing within that programme. Upper-level subjects should normally build on lower level subjects. Pre-requisite requirements, if any, must therefore be spelt out on a subject basis.

A ‘subject’ is defined as a discrete section of the programme which is assigned a separate assessment. A list of subjects, together with their level and weightings, shall be published in the Programme Requirement Document.

The language of assessment for all programmes/subjects shall be English, unless approval is given for it to be otherwise. Such approval shall normally be granted at the stage of validation.

4.8 Principles of Assessment

Assessment of learning and assessment for learning are both important for assuring the quality of student

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

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

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

4.9 Assessment Methods

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

Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous assessment assignments which involve group work should nevertheless include some individual components therein. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately, and this can result in different grades being awarded to students in the same group.

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

At the beginning of each semester, the subject lecturer should inform students the details of the methods of assessments to be used, within the assessment framework as specified in the Programme Requirement Document.

4.10 Progression/Academic Probation/Deregistration

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

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

When a student has a Grade Point Average (GPA) lower than 1.70, he will be put on academic probation in the following semester. If a student is able to pull his 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 the transcript of studies.

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

(i) the student has reached the final year of the normal period of registration for that programme, as specified in the Programme Requirement Document, unless approval has been given for extension (applicable to students admitted in or after 2020/21); **or**
(ii) the student has reached the maximum number of retakes allowed for a failed compulsory subject; **or**
(iii) the student's GPA is lower than 1.70 for two consecutive semesters and his Semester GPA in the second semester is also lower than 1.70; **or**
(iv) the student's GPA is lower than 1.70 for three consecutive semesters.

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

A student may be deregistered from the programme enrolled before the time frame specified in the above conditions (iii) or (iv) if his academic performance is poor to the extent that the Board of Examiners deems that his chance of attaining a GPA of 1.70 at the end of the programme is slim or impossible.

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

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

4.11 Retaking of Subjects

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 the maximum study load of 21 credits per semester is not exceeded.

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

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.

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

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. In case the 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.

4.12 Exceptional Circumstances

Absence from an assessment component

If a student is unable to complete all the assessment components of a subject, due to illness or other circumstances 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.

The student concerned is required to submit his application for late assessment in writing to the Head of Department offering the subject, within five working days from the date of the examination, together with any original 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. Verification of the supporting documents with the issuing authority may be conducted by the subject offering Department as part of the approval process.

4.13 Grading

Assessment grades shall be awarded on a criterion-referenced basis. A student's overall performance in a subject shall be graded as follows from 2020/21 onwards.

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.

"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+

A numeral grade point is assigned to each subject grade. The grade points assigned to subject grades 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

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:

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

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, but 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 from 2020/21.

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 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).

Subjects offered within the Programme 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 15.2 above.

4.14 Guidelines for Award Classification

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.

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

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)].

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.

Decisions by the Board 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.

4.15 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.

Application to graduate with a specialism

Students who wish to graduate from the MSc award with a specialism *(the specialism study options currently offered are listed under Section 1.1)* should apply for graduation via Form AR84c in the semester they deem having satisfied the award requirements concerned.

Students should refer to the Student Handbook for the application deadline stipulated for each semester. Applications for graduation will be considered by the 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 the 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

PART B SYLLABI

Subject Description Form

Subject Code	ME534
Subject Title	Engineering Acoustics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Dynamics and Vibrations.
Objectives	To provide the ingredients for students to acquire a sound background in modern acoustics and control of noise.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess state-of-the-art knowledge and skills in the area of physical characteristics of sound, noise radiation mechanism and phenomena of sound propagation; b. apply their knowledge, skills and hand-on experience to measure and analyse the content of sound and design the noise control system; c. extend their knowledge of noise radiation mechanism and noise control principles to different situations of engineering context and professional practice; and d. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Fundamentals of Acoustics:*** Vibration of single-degree-of-freedom system and continuous system; physical characteristics of sound; noise effect on human beings and noise pollution; human ear; subjective response to noise; wave propagation in fluid media; sound speed; sound energy, power and intensity; modeling of sound waves; Euler's equation of motion; wave equation and Helmholtz equation; general solution to wave equation. ***Wave Propagation with the Presence of Boundaries:*** Reflection at rigid and impedance boundaries; sound transmission through interfaces; sound transmission control; reactive silencer; Helmholtz resonator; acoustic modes; calculation of room modes. ***Noise Analysis:*** Quantitative measures of sound; frequency content of sounds; acoustic scales; data acquisition and acoustic measurement systems; digital sampling; signal processing; frequency analysis. ***Noise Sources:*** Monopole; Dipole; Addition of Sound sources; Sound radiation; Coupling between vibration and sound waves; Elementary sound radiators such as piston and panel; and sound source modeling. ***Noise Control:*** Noise attenuation techniques; active noise cancellation; noise barrier and insertion loss; acoustical properties of sound absorbing materials; principles of impedance tube measurement; damping and absorption; viscoelastic damping treatment; impedance of wall structures; calculation of noise level inside a room; transmission and acoustic isolation.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, tests, mini-project or case study, and final examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for engineering acoustics.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/ Case study/ Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. Hansen C. H. and Snyder S. D., *Active Control of Noise and Vibration*, Spon, latest eidtion.
2. Pierce A. D., *Acoustics*, Acoustic Society of America, latest edition.
3. Kleppe J. A., *Engineering Application of Acoustics*, Artech House, latest edition.
4. Everest F. A., *The Master Handbook of Acoustics*, Tab Books Inc., latest edition.
5. Bies D. A. and Hansen C. H., *Engineering Noise Control*, Spon, latest edition.
6. Norton M. P., Fundamentals of *Noise and Vibration Analysis for Engineers*, Cambridge University Press, latest edition.

	7. Kinsler L. E. et al, *Fundamentals of acoustics*, Wiley, latest edition. Journals: • The Journal of the Acoustical Society of America, Acoustical Society of America. • Journal of Sound and Vibration, Academic Press. • Acustica united with Acta Acustica, S. Hirzel Verlag. • Applied Acoustics, Elsevier Applied Science.
Last Update	June 2024

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME536</td></tr>
<tr><td>Subject Title</td><td>Vibrations and Structure-borne Noise</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>Students should have basic knowledge in Dynamics.

Exclusion: ME6101 Advanced Theory and Methods in Vibration Analysis</td></tr>
<tr><td>Objectives</td><td>To provide the students an in-depth study in vibration analysis and measurement, and to equip the students with the ability for treating the general vibration problems related to noise abatement at source.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of the noise radiation and vibration mechanism, the relation between noise and vibration and vibration control;
b. apply their knowledge, skills and hand-on experience to measure and analyse the content of vibration and design the vibration control system;
c. extend their knowledge of the analysis of structural vibration and sound radiation to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Noise Pollution Control at Source: Relation between vibration and noise vibration as noise sources; classification of analysis of machinery vibrations.
Vibration Control: Sources of vibration; vibration basics; vibration analysis of continuous structures; vibration isolation and absorption; passive and active vibration control.
Experimental Assessment of Vibrations: Basic measurement system; signal processing; modal parameter identification; time-domain and frequency-domain vibration analysis.
Noise Generated by Vibrating Structures and Control: Elementary noise radiators; noise radiation by machine; noise source identification; sound intensity measurement; identification of noise source; noise radiation and transmission; design principles for noise reduction.
Typical Laboratory Experiments:
• Structural modal testing
• Vibration control
• Measurement of sound intensity</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for vibrations and structure-borne noise.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	10%	√	√	√	
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	42 Hrs.
▪ Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Rao S. S., *Mechanical Vibrations*, Third Edition, Addison-Wesley, latest edition.
2. Thomson W. T, *Theory of Vibration with Applications*, Prentice Hall, latest edition.
3. Dimarogonas A., *Vibration for Engineers, Second Edition*, Prentice-Hall, latest edition.
4. Ewins D.J., *Modal Testing: Theory and Practice*, Research Studies Press Ltd., John Wiley, latest edition.
5. Barron R., *Engineering Condition Monitoring*: Practice, Methods and Applications, Addison Wesley Longman, latest edition.
6. Lyon R. H., *Machinery Noise and Diagnostics*, Butterworths, latest edition.
7. Junger M. C. and Feit D., Sound, Structures and Their Interaction, ASA, latest edition.

Subject Description Form

Subject Code	ME548
Subject Title	Computer Aided Product Analysis
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge of Mechanical Engineering, Building Service Engineering, Civil and Structural Engineering, Manufacturing Engineering, Product Design and Development, and Materials Science.
Objectives	To provide students with CAD/CAE knowledge and a good understanding of CAD and CAE technologies. The subject covers CAD, Finite Element Method, EM, computer-aided analysis, integration of CAD and CAE, and virtual engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess knowledge in the area of principle and formulations of finite element method, computer-aided design and engineering; b. analyze static and dynamic stress and strain behaviours and thermal engineering of structures and products using CAD and CAE techniques; c. apply their knowledge and skills to design and develop products; and d. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	**1. Computer-Aided Design (CAD)** 1.1 Introduction to computer-aided design. 1.2 Product geometric models: Wireframe model, Surface model, Solid Model. 1.3 CAD geometry modelling: Wireframe geometry modelling, Surface modelling, Solid modelling. 1.4 CAD application: CAD-enabled injection mould design. **2. Computer-Aided Engineering (CAE)** 2.1 Introduction to Finite Element Method (FEM) and FEM analysis 2.2 FEM Principles, Methods to establish FEM formulation, shape functions, element type and selection, FEM mesh generation. 2.3 Finite Element Modeling and Simulation: Finite element modelling and simulation, stress computation and analysis, strain computation and analysis, and thermal engineering analysis. 2.4 Finite element simulation enabled solution generation. **3: CAD/CAE applications** 3.1 Data exchange standards. 3.2 CAD and CAE integration. 3.3 CAD/CAE enabled deformed product design and development. 3.4 CAD/CAE enabled cast product design and development. **4. Simulation-enabled design optimization:** 4.1 Geometric size design and optimization. 4.2 Geometric shape design and optimization.

Teaching/Learning Methodology

1. The teaching and learning methods include lecture/tutorial sessions, homework assignments, tests, case study reports and examinations.
2. The continuous assessment and examination are aimed at providing students with the integrated knowledge required for computer-aided analysis.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	10%	√	√	√	√
2. Study report	10%	√	√	√	√
3. Project, project report and presentation	30%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

The continuous assessment consists of three components: homework assignments, study reports, and project, project reports & presentations. They are aimed at evaluating the progress of students' study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes and enhancing the integration of the knowledge learnt.

The examination is used to assess the knowledge acquired by the students to understand and analyze the problems critically and independently and to determine the degree to which they have achieved the subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case Study/Laboratory	15 Hrs.
Other student study efforts:	
▪ Self Study	42 Hrs.
▪ Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Fuh Y., Zhang Y.F., Nee A.Y.C., Fu M.W., Computer-aided injection mould design and manufacture, Marcel Dekker, Inc., New York, April 2004
2. Law A. M. and Kelton D. W., Simulation Modeling and Analysis, McGraw-Hill, latest edition.

	3. Przemieniecki, J. S., Finite Element Structural Analysis, New Concepts, AIAA, latest edition. 4. Fu M.W., Design and Development of Metal Forming Processes and Products aided by Finite Element Simulation, Springer International Publishing AG, 2016.
Last Update	July 2024

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME552</td></tr>
<tr><td>Subject Title</td><td>Integrated Engineering Design</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>Students should have a good foundation in mechanical sciences.</td></tr>
<tr><td>Objectives</td><td>To provide the students with practical experiences in the consecutive stages in design, analysis and development of a new product; to introduce various important considerations in product design and development, and their integration with critical engineering analysis in producing a new product; to introduce project management techniques in producing a new product.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of engineering design and product development process;
b. be able to apply their knowledge and contribute to professional competence, including ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability;
c. work as an effect team member and have the readiness in assuming a leadership role in a design project;
d. think holistically, critically, strategically and creatively in dealing with complex problems and situations pertinent to a design project.
e. have a good mastery of critical and creative thinking skills and generate practical and innovative solutions to novel problems; and
f. have an ability to recognize the need and engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Conceptual Product Design: Customer needs and market situation; technical and business concerns; environmental issues; cultural and social issues; aesthetic and semantic issues; establish product function; visualization skills and CAD.
Engineering Analysis of Design: Benchmarking and establishing engineering specifications of the product; design concept selection; product embodiment: design refining and system modeling; analytical and numerical model solutions; design for manufacture and assembly; CAE and optimization.
Product Development Techniques: Goals of prototyping; types and uses of prototypes; rapid prototyping techniques; physical models and experimentation.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for integrated engineering design.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="6">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Homework assignment	20%	√	√	√	√	√	√
2. Test	20%	√	√		√	√	√
3. Case study report and presentation	20%	√	√	√	√	√	√
4. Examination	40%	√	√	√	√	√	√
Total	100%						

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Pahl G. and Beitz W., *Engineering Design*, Springer-Verlag, latest edition.
2. Ulrich K. and Eppinger S., *Product Design and Development*, McGraw-Hill, latest edition.
3. Otto K. and Wood K., Product Design: *Techniques in Reverse Engineering and New Product Development*, Prentice Hall, latest edition.
4. Clausing D., *Quality Function Deployment*, MIT Press, latest edition.
5. Crawford C. M. and Di Benedetto C.A., *New Product Management*, McGraw-Hill, latest edition.
6. Cooper R. G., Winning at *New Products: Accelerating the Process from Idea to Launch*, Perseus Books, latest edition.
7. Buchanan R. et al., *The Idea of Design*, MIT Press, latest edition.
8. Adams J. L., *Conceptual Blockbusting: a Guide to Better Ideas*, Addison-Wesley, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME556</td></tr>
<tr><td>Subject Title</td><td>Advanced Combustion Systems</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>Students should have basic knowledge in Thermofluids.

Exclusion: ME541 Combustion Systems and Air Pollution Control</td></tr>
<tr><td>Objectives</td><td>To provide knowledge about the constructions and operation principles, as well as the techniques for performance evaluation of the domestic and industrial combustion systems, which are commonly used in Hong Kong and the surrounding regions; to provide knowledge about the flame and combustion characteristics, and the emissions associated with these combustion systems; to provide knowledge about the thermal modelling techniques of industrial furnace, the design method of industrial chimney and the techniques to predict the dispersion from chimney.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills and be able to contribute to their professional competence in the area of combustion systems (including combustion, heat transfer and emissions);
b. think holistically and critically in solving complex problems and situations pertaining to their professional practice;
c. have recognition of the need for, and an ability to engage in life-long learning;
d. increase their awareness of the local and global environmental issues, existing regulation and policies, as well as the state-of-the-art technologies.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Flame: Premixed and diffusion flames; flame structures and characteristics; effect of fuel types; laminar and turbulent flames; effects of equivalence ratio and Reynolds number; flame stability; effect of combustion on emissions.

Domestic Gas-fired Appliances: Applications; flame and fuel types; design criteria of burner/appliance; heating efficiency assessment; emissions and safety.

Industrial Furnaces: Gas-fired, oil-fired and coal-fired industrial furnaces; burning of gaseous, liquid and solid fuels in furnaces; burners and atomizers; stoker-fired and pulverized-fired furnaces; types of emissions and their control; measurement and analysis of flue gases; handling equipment; selection of combustion equipment.

Thermal Modeling of Furnaces: Heat transfer mechanisms in furnaces; forced convection and gaseous radiation in furnaces; Hottel's zonal method; single gas zone and plug-flow regions; energy balance in furnaces; modeling of combustion products for gaseous radiation calculations.

Chimneys and Flues: Function and operation problems of chimney; design criteria; chimney sizing and thermal insulation; construction and linings; modeling of dispersion of emissions from chimney.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced combustion systems.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		√
3. Case study report and presentation	10%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Borman G. L. and Ragland K. W., *Combustion Engineering*, McGraw-Hill, latest edition.
2. Turns S. R., *An Introduction to Combustion: Concepts and Applications*, McGraw-Hill, latest edition.
3. CIBSE, *Combustion Systems*, CIBSE Guide, Section B13, latest edition.
4. Rogers G. and Mayhew Y., *Engineering Thermodynamics* – Work and Heat Transfer, 4th edition, Longman, latest edition.
5. Modest M. F., *Radiative Heat Transfer*, McGraw-Hill, latest edition.

Subject Description Form

Subject Code	ME558
Subject Title	Advanced Materials and Structural Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Mathematics, Engineering Materials, and Solid Mechanics. Exclusion: ME550 Materials and Smart Structural Design
Objectives	To provide students with knowledge of the mechanical behaviour, manufacturing process and utilizations of advanced composite materials, smart materials and structures, and nano-materials for product design and development with a special emphasize on aircraft applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand the mechanics of advanced composite materials, especially the mechanics of a lamina and laminates, including failure mechanisms; b. possess the state-of-the-art knowledge on smart materials and smart structure design; c. recognize the importance of nano-materials in advanced technology; and d. understand the application of advanced composites, smart materials, smart structures, and nano-materials in aircraft design.
Subject Synopsis/ Indicative Syllabus	***Advanced Composite Materials:*** Composite constituents; principles of fibre-reinforced composites; mechanics of a lamina; mechanics of laminates, tooling and manufacturing processes; failure criteria for composites; aircraft applications and related design issues. ***Piezoelectric Materials:*** The fundamental mechanisms of piezoelectric materials and major applications, Curie temperature, concept of piezoelectric moduli and applications of these moduli in design of sensors and actuators, smart structure design issues. ***Shape Memory Alloys (SMA):*** Phenomena & mechanisms of temperature controlled shape memory effect, critical temperatures, stress effect on critical temperatures, mechanical properties of SMA at different phases and temperatures, shape memory and superelasticity, modeling of the effects of temperature and stress, special design considerations at joints, continuum vs. discrete applications of SMA, major impediments to applications of SMA. ***Nanomaterials:*** Nano-materials for product design; mechanical and thermal properties of nano-composite materials. ***Smart Structures:*** Introduction to smart structures; fibre-optic sensors; integrated sensing, controlling and actuating techniques. Selected applications of smart structures in aircraft design. ***Laboratory Works:*** • Mechanical properties of shape memory alloys. • Strain measurement of composite structures using embedded fibre-optic sensors.
Teaching/Learning Methodology	1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, mini-project or case study and examination. 2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced materials and structural design. 3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lecture	√	√	√	√
2. Tutorial	√	√	√	√
3. Homework assignment	√	√		√
4. Mini-project/Case study report and presentation		√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	20%	√	√		√
2. Test	15%	√			
3. Mini-project/Case study report and presentation	15%		√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case Study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	42 Hrs.
▪ Mini-project/Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Alan Baker, Stuart Dutton and Donald Kelly, *Composite Materials for Aircraft Structures*, AIAA, latest edition.
2. Ronald F. Gibson, *Principles of Composite Material Mechanics*, McGRAL-HILL, latest edition.
3. Srinivasan A. V. and McFarland D. M., *Smart Structures*, Cambridge University Press, latest edition.
4. Banks H. T., Smith R. C. and Wang Y., *Smart Material Structures*, John Wiley & Sons, latest edition.
5. Nanostructured Materials - Processing, Properties, and Applications, edited by Carl C. Koch, William Andrew Publishing, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME559</td></tr>
<tr><td>Subject Title</td><td>Advanced Environmental and Transportation Noise 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>Students should have basic knowledge in Thermofluids and Noise. Some working experience in industry or environmental sectors is desirable.

Exclusion: ME535 Industrial and Transportation Noise Control</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of practical and systematic approach to control noise due to environmental and transportation noise sources.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of physical parameters of sound in transportation and the assessment method;
b. apply their knowledge, skills and hand-on experience to measure, calculate and assess the noise level in transportation and keeping aware of the environmental issues, existing regulation and policies concerning noise control;
c. extend their knowledge of sound prediction and noise assessment to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Road Traffic Noise: Traffic noise indices; calculation of road traffic noise (CRTN) – prediction procedures; the measurement of road traffic noise; the standard drive past test; assessment of noise and vibration impacts due to road traffic.
Control of Vehicle Noise: Identification of noise sources; strategies for controlling vehicle noise; porous pavement for reducing tyre noise; acoustical performance of traffic noise barriers; absorptive barriers; in-situ determination of the acoustical performance of roadside barriers.
Aircraft Noise: Aircraft noise indices; noise certification; aircraft noise sources; the integrated noise model (INM) for aircraft noise prediction; Nordic guidelines for calculation of air traffic noise.
Rail Transport Noise: Railway noise indices; sources of train noise; prediction of train noise – calculation of rail noise (CRN); strategies of controlling rail noise; vibration from railways and its control; measurement techniques.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced environmental and transportation noise control.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</td><td>√</td><td>√</td><td>√</td><td></td></tr>
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</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	20%	√	√	√	
4. Examination	40%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Bies D. A. and Hansen C. H., *Engineering Noise Control – Theory and Practice,* E&FN Spon, latest edition.
2. Bell, L. H. *Industrial Noise Control – Fundamentals and Applications*, Marcel Dekker Inc., latest edition.
3. Institute of Acoustics, *Diploma in Acoustics and Noise Control – Tutored Distance Learning Programme, Transportation Noise Unit 1 and Unit 2*.
4. Nelson P. M. (Ed.), *Transportation noise Reference Book*, Butterworths, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME566</td></tr>
<tr><td>Subject Title</td><td>Industrial and Environmental Measurement Technology</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>Students should have basic knowledge in Mechanical Engineering; Building Services; Civil & Structural Engineering, Manufacture Engineering. Some working experience in industries is desirable.</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of advanced measurement technology and applications in industry.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of random data analysis, various measurement techniques, including flow, temperature / heat, force, etc;
b. apply their knowledge, skills and hand-on experience, gained from the subject, to the measurement of flow systems and data analysis;
c. extend their knowledge of mechanical engineering to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Random Signal Analysis: Probability density function, time-average, variance, skewness and kurtosis of signals; auto-correlation and cross-correlation functions; power spectral density function of a signal; spectral phase and coherence between two random signals; ensemble averaging technique.
Flow Measurement: Thermal anemometers; laser Doppler velocimetry; particle imaging velocimetry; flow visualization techniques.
Temperature and Heat Measurements: Fibre-optic grating sensors; constant current anemometer and thermocouples; surface temperature sensing with thermochromic liquid crystals and laser interferometry.
Vibration Measurement: Vibration measurement system; fibre-optic Bragg grating sensors, transducers, piezoelectric accelerometers, force transducers, laser vibrometers, strain gauge, electromechanical shakers and hammers.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for industrial and environmental measurement technology.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	20%	√	√	√	
4. Examination	40%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Goldstein R. J., *Fluid Mechanics Measurements*, Taylor & Francis, latest edition.
2. Beckwith, T. G., Marangoni R. D. and Lienhard J. H., *Mechanical Measurements*, Addison-Wesley Publishing Company, latest edition.
3. Bendat J. S. and Piersol A. G., *Engineering Applications of Correlation and Spectral Analysis*, John Wiley & Sons, Inc. latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME567</td></tr>
<tr><td>Subject Title</td><td>Advanced Control Technology</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>Students should have basic knowledge in System Dynamics and Control, Industrial Automation, and Mechatronics. Some working experience in Control and Automation is desirable.</td></tr>
<tr><td>Objectives</td><td>To provide students with a good understanding of advanced control technology and its applications in mechanical engineering.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of advanced control technology and its application to different mechanical systems;
b. apply their knowledge, skills and hand-on experience to design, develop, manufacture, and analyze mechanical systems with advanced control features or functions for desired needs;
c. extend their knowledge of advanced control technology and its application to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Analog Control: Controller design using state-space methods; causality of feedback systems; controllability and observability of linear systems.
Optimal Control: Motivation of optimal feedback controller design; linear quadratic optimal control; elementary theory of nonlinear feedback control; feedback linearization control.
Digital Control: Introductory digital control; sampled-data systems; anti-alias filters; sample rate selection; discrete-time systems and z-transform; digital controller design.
Microcomputer Implementation: Microcomputer implementation of controllers; introduction to system identification; self-tuning control; control of twin-rotor system; control of an inverted pendulum.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced control technology.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	30%	√	√	√	√
2. Case study/Lab report and presentation	10%	√	√	√	
3. Examination	60%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratary	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Bryson A. E., *Applied Linear Optimal Control: Examples and Algorithms*, New York, N.Y.: Cambridge University Press, latest edition.
2. Dorsey, John. *Continuous and Discrete Control Systems: Modeling, Identification, Design, and Implementation*, Boston: McGraw-Hill, latest edition.
3. Kisačanin, Branislav, *Linear Control Systems: with Solved Problems and MATLAB Examples*, New York : Kluwer Academic/Plenum Publishers, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME569</td></tr>
<tr><td>Subject Title</td><td>Thermal System Design and Management</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>Students should have basic knowledge in Thermofluids.</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of advanced thermal technology; and make students have the ability to solve practical problems in industry.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of heat transfer and thermal sciences, be able to apply their knowledge and skills in designing and developing products or engineering systems;
b. think critically and holistically in dealing with real thermal and energy problems, and generate practical solutions; and
c. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Review of Heat Transfer: Steady and unsteady conduction; forced and natural convection, and radiation.
Heat Pipe: Theory of heat pipe; types of the heat pipe; heat pipe design and manufacturing; heat pipe applications.
Cooling of Electronic Equipment: Cooling load of electronic equipment; thermal environment; conduction cooling, convection cooling and liquid cooling.
Heating and Cooling of Buildings: Thermal comfort; design conditions for heating and cooling; heat gain from people; lights and appliances; solar heat gain; infiltration heat load and weatherizing.
Refrigeration and Freezing of Foods: Control of microorganisms in foods; thermal properties of foods; refrigeration of fruits, vegetables and cut flowers; refrigeration of meats, poultry and fish; refrigeration of eggs, milk and bakery products; refrigeration load of cold storage rooms; transportation of refrigerated foods.
Solar Energy: Solar irradiation, solar energy conversion, solar energy collector.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for thermal system design and management.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<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. Lecture</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and Presentation</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. Homework assignment	20%	√	√	√
2. Test	20%	√	√	
3. Case study report and presentation	20%	√	√	√
4. Examination	40%	√	√	√
Total	100%			

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Cengel Y. A., *Heat Transfer*, McGraw-Hill, latest edition.
2. Rohsenow W. M., Hartnett J. P. and Ganić E. N., *Handbook of Heat Transfer Applications*, New York: McGraw-Hill, latest edition.
3. Incropera F. P. and DeWitt D. P., *Fundamentals of Heat and Mass Transfer*, John Wiley & Sons, Inc. latest edition.

Subject Description Form

Subject Code	ME570
Subject Title	Advanced Product Mechatronics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in fundamentals of system dynamics and automatic control, familiar with control systems, computer language in Matlab. Exclusion: ME553 Product Mechatronics
Objectives	To provide students with knowledge of designing and analyzing intelligent product embedded with microcontrollers. Students will learn to integrate sensors, microcontrollers, and actuators to design intelligent products.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess state-of-the-art knowledge and skills in the area of advanced mechatronics in product design and analysis; b. apply their knowledge, skills and hand-on experience to design, develop, manufacture, and analyze new products with advanced mechantronics features or functions for desired needs; c. extend their knowledge of advanced mechatronics to different situations of engineering context and professional practice; and d. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Mechatronic System:*** Configuration of mechatronic systems; sensors and transducers, and signal conditioning circuits; actuators: electrical, mechanical and pneumatic; drivers; measurement and guidance of moving parts. ***Signal Processing Techniques:*** Analog and digital filters; Nyquist sampling theorem; controller design and implementation; data converters (analog-to-digital, digital-to-analog); microcontrollers and their applications; interfacing and power sources. ***Mechatronic System Analysis:*** Design and implementation; problem definition; system requirement; integration and design criteria. ***Typical Case Studies and Projects of Mechatronic Systems:*** • Design of a home security system • Analysis and design of auto-focusing in a camera lens system • Skip control of a CD player • Programming and control of robots or CNC machines • Application of mechatronics to the design of smart toys or products • Intelligent control of home appliances • Integration of ultrasonic sensors, infrared sensors, actuators, and a • microcontroller in an AGV system. • Mechatronic systems with multiple microcontrollers ***Typical Laboratory Experiments:*** • Implementation and tuning of DC motor and stepper motor controllers • Implementation of an ultrasonic sensor system • Interfacing between microcontrollers (serial or parallel)

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced product mechatronics.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	20%	√	√	√	√
2. Test, case study report and presentation	20%	√	√		√
3. Examination	60%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References	Textbooks: 1. *Design with Microprocessors for Mechanical Engineers* by Stiffler, McGraw-Hill 2. *Introduction to Mechatronics and Measurement Systems*, by Alciatore and Histand, McGraw-Hill 3. *Mechatronics*, by Necsulescu, Prentice Hall 4. *Mechatronics - Electromechanics and Controlmechanics*, by Mill, Springer-Verlag 5. *Mechatronics - Electronic Control Systems in Mechanical Engineering*, by Bolton, Addison Wesley 6. *Mechatronics - Electronics in Products and Processes*, by Bradley, et al., Chapman and Hall 7. *Mechatronics - Mechanical System Interfacing*, by Auslander and Kempf, Prentice Hall 8. *Mechatronics System Design*, by Shetty and Kolk, PWS Publishing Journals: 1. *Transactions on Mechatronics*, IEEE and ASME 2. *Transactions on Industrial Electronics*, IEEE 3. *Transactions on Instrumentation and Measurement*, IEEE

Subject Description Form

Subject Code	ME571
Subject Title	Corrosion Control
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Engineering Materials. Exclusion: ME538 Corrosion Controls in Pollution Management
Objectives	To provide students with comprehensive knowledge about corrosion/ materials degradation and preventive methodologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess state-of-the-art knowledge and skills in the area of metal corrosion and protection technology; b. think critically and holistically in dealing with real corrosion problems, and generate practical solutions; and c. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Significance of Corrosion and Materials Degradation:*** Definitions and forms of corrosion and materials degradation; implications to economy and human society. ***Oxidation & Its Control:*** Oxidation at elevated temperature; thermodynamics and kinetics of oxidation; oxide structures; oxidation rate; effects of alloying; high temperature alloys and coatings for oxidation control. ***Corrosion Theory:*** Structure of water and aqueous solution; concept of pH; thermodynamics of corrosion; electrodes and electrode potentials; Nernst equation; corrosion products and passivity; classification of corrosion; corrosion rate. ***Metallurgical Cells and Environmental Cells:*** Effect of purity and crystal defects; galvanic corrosion; dealloying; stress cell and concentration cells; effect of velocity and temperature; crevice corrosion; pitting; microbial corrosion. ***Corrosive-mechanical Interaction:*** Erosion corrosion; corrosive wear; corrosion fatigue; hydrogen damage; stress corrosion cracking. ***Protective Coatings:*** Surface preparation; electrodeposition; hot-dip coatings; conversion coatings; paint coatings for metals. ***Corrosion Control of Common Metals:*** Iron and steels; aluminium and its alloys. ***Corrosion Control in Aviation:*** Airframes; gas turbine engines. ***Corrosion Control in Automobile:*** Automobile bodies, engines, and bright trim. ***Corrosion Control in Food Processing:*** Tinplate for food and beverage cans; dairy industries; brewing. ***Corrosion Control in Building Construction:*** Structures of buildings; cladding; metal roofs; siding and flashing; pumping and central heating; timber; leisure pool. ***Materials Selection and Design for Corrosion Control*** **Laboratory works:** • AFM examination of surface morphology • Corrosion rate measurement of steel • Oxidation kinetics of copper

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for corrosion control.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lecture	√	√	√
2. Tutorial	√	√	√
3. Homework assignment	√	√	√
4. Case study report and presentation	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignment	20%	√	√	√
2. Test	20%	√	√	
3. Case study report and presentation	10%	√	√	√
4. Examination	50%	√	√	√
Total	100%			

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	42 Hrs.
▪ Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. David Talbot and James Talbot (1998), "*Corrosion Science and Technology*", *H749.H34B78*, latest edition.
2. Denny A. Jones (1996), "*Principles and Prevention of Corrosion*", *TA462.J59,* latest edition.
3. Mars G. Fontana (1986), "*Corrosion Engineering*", *TA418.74.F6*, latest edition.
4. J.C. Scully (1990), "*The Fundamentals of Corrosion*", *TA462.S39*, latest edition.
5. Samuel A. Bradford (2001), "*Corrosion Control*", *TA462.B648*, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME572</td></tr>
<tr><td>Subject Title</td><td>Design for Sustainable Development</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>Students should have basic knowledge in engineering and applied sciences.</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of design for sustainable development.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess the knowledge of environmental issues in the manufacturing environment, environmental management system and design for environment;
b. apply their knowledge, skills and hand-on experience to design for environment; and
c. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Introduction to Environmental Issues in the Manufacturing Environment: Global environmental issues; environmental issues in the manufacturing environment: air quality, water quality and hazardous waste issues; impact on our environment and health hazards; sustainable development.
Environmental Management System: Environmental management standards; development of ISO 14000 series; design and implementation of environmental management system; environmental auditing, environmental performance, life cycle assessment, and environmental labels and declarations; environmental products declarations.
Design for Environment: Introduction to design for environment; product life cycle; eco-design and traditional design; sustainable product design; integrated product and process design and development; eco-design strategies; packaging and distribution. materials recycling.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
<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. Lecture</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td></td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td></td></tr>
<tr><td>4. Case study report and presentation</td><td>√</td><td>√</td><td>√</td></tr>
</table>
1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for design for sustainable development.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
</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. Homework assignment	15%	√	√	
2. Test	20%	√	√	
3. Case study report and presentation	15%	√	√	√
4. Examination	50%	√	√	
Total	100%			

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Allen D.T. and Shonnard D.R., *Green Engineering- Environmentally Conscious Design of Chemical Processes*, Prentice Hall, latest edition.
2. Azapagic A. and Perdan S., *Sustainable Development in Practice.* John Wiley, latest edition.
3. Block M.R., *Effective Implementation of ISO 14001*, ASQ Quality Press, latest edition.
4. Fiksel J., *Design for Environment: Creating Eco-Efficient Products and Processes*, McGraw Hill, latest edition.
5. Giudice F., Rosa G.L. and Risitano A., *Product Design for the Environment: A Life Cycle Approach*, CRC Press, latest edition.
6. Goosen M.F.A., Schaffner, F.C., Laboy-Nieves, E.N. and Abdelhadi, A.H., *Environmental Management, Sustainable Development and Human Health*, CRC Press, latest edition.
7. Kinsella J. and McCully, A.D., *Handbook for Implementing an ISO 14001 Environmental Management System: a Practical Approach*, Shaw Environmental, latest edition.
8. Morris A.S., *ISO14000 Environmental Management Standards- Engineering and Financial Aspects*, John Wiley & Sons Ltd., latest edition.
9. Piper L., Ryding S.O. and Henricson C., *Continual Improvement with ISO14000*, IOS Press, latest edition.
10. Sheldon C. and Yoxon M., *Environmental Management Systems: a Step-by-Step Guide to Implementation and Maintenance*, Earthscan, latest edition.
11. Wright R.T., *Environmental Science: Toward a Sustainable Future*, Pearson/Prentice Hall, latest edition.

Journals:

- International Journal of Sustainable Development and Planning, WIT Press.
- International Journal of Sustainable Engineering, Taylor & Francis.
- Sustainable Development, Wiley InterScience.
- The Journal of Sustainable Product Design, Springer.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME573</td></tr>
<tr><td>Subject Title</td><td>Project on Product Design and Management</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>Students should have basic knowledge in Engineering and Applied Sciences.</td></tr>
<tr><td>Objectives</td><td>The subject helps student to learn, through a capstone project, how to carry out market analysis and how to manage a project. Through this project, the student will develop teamwork skills and product development abilities.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Think critically and holistically in dealing with product design project with real products, and generate realizable solutions.
b. Possess state-of-the-art knowledge and skills in the area of project on product design and management.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Overview of Marketing: Market needs research; dynamic marketing environment; identification and selection of markets; price determination and pricing strategies; knowledge of user requirements.
New Product Management: Product life cycle; product life management; user-centered and market-driven approaches; team dynamics, budget, specifications and time management techniques; quality assurance and ISO. risk management.
Capstone Project: A group product design project.
<u>Capstone project assessment</u><u>:</u>
• Feasibility study report;
• Creativity, design considerations, analysis and work accomplishment;
• Group discussion on the progress (Peer evaluation is required.)
• An interim group oral presentation.
• A formal written group report and an oral presentation at the end of the study, effort of every member in the same project group should be clearly acknowledged.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, assignments, and group product design project.
2. The continuous assessment is aimed at providing students with integrated knowledge required for product design and management.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="2">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td></tr>
<tr><td>1. Lectures</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorials</td><td>√</td><td>√</td></tr>
<tr><td>3. Assignments</td><td>√</td><td>√</td></tr>
<tr><td>4. Group product design project</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	
1. Group assessment (Interim oral presentation & report, final project report & oral presentation)	50%	√	√
2. Individual assessment (Project proposal, conceptual designs, final oral presentation, peer assessment, test)	50% (30% for the Test)	√	√
Total	100%		

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

Overall Assessment: 1.0 ☐Continuous Assessment

The subject learning outcomes are achieved through a group product design project undertaken by the students. Each group consists of 3 to 4 students. Both individual and group level contributions are necessary to complete the project. The assessments are done based on the written reports, oral presentations and assignments submitted by the students periodically. The evaluations and the feedback provided will help the students in self-monitoring and fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

Student Study Effort Expected

Class contact:	
• Lecture	16 Hrs.
• Tutorial/Consultation	23 Hrs.
Other student study effort:	
• Self Study/Group activities	45 Hrs.
• Project report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbook:

1. Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, McGraw-Hill, 2008.

References:

1. George E. Dieter and Linda C. Schmidt, Engineering Design, McGraw- Hill, 2009.
2. Product realization [electronic resource]: a comprehensive approach/Mileta M. Tomovic, Shaoping Wang, (http://www.springerlink.com/content/978-0-387-09481-6)
3. E-Book: Project management in new product development [electronic resource]/Burce T. Barkley, Sr. (http://lib.myilibrary.com/browse/open.asp?id=110947&loc=)

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME574</td></tr>
<tr><td>Subject Title</td><td>Product Noise 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>Students should have basic knowledge in Dynamics and Thermofluids.</td></tr>
<tr><td>Objectives</td><td>To provide the advanced knowledge of noise radiation mechanisms including the vibration of moving parts and flow induced noise. The principle and methodology of noise control, in particular during designing a product, are then demonstrated with a few of examples.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of noise radiation mechanisms and noise/vibration control principles;
b. apply their knowledge, skills and hand-on experience to design, develop, manufacture, and analyze new products by considering noise/vibration control and keeping aware of the environmental issues, existing regulation and policies concerning noise control;
c. extend their knowledge of noise radiation mechanism and noise/vibration control principles to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Acoustic Quality of Products: Basics of sound radiation; hearing and hearing loss; A-weighting; Characterization of sound sources and sound propagation; ISO standards of noise source testing for typical products and industrial facilities, use of anechoic and reverberation chambers.
Basic Sources of Product Noise: Mechanisms, estimates and measurement of noise radiated by a variety of mechanical equipment such as fans, blowers, compressors, pumps, cooling towers, turbines and jets; flow-induced noise.
Noise Abatement Techniques and Applications: Sound absorption by fibrous materials, sound reflection by impedance discontinuities, active noise control; noise isolation, enclosures, control of flow noise in fans, pumps and compressors, silencers/mufflers and other control of noise along its propagation path.
Vibration Control and Applications: Structural response to excitation, vibration and flutter of engineering structure; active and passive vibration control and suppression; structural vibration control for engineering products, including bridge, aircraft, etc.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for product noise control.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	10%	√	√	√	
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Beranek L. L. and Ver I. L. (editors), *Noise and Vibration Control Engineering, principles and applications*. New York: Wiley, latest edition.
2. Pierce A. D., *Acoustics: An Introduction to its Physical Principles and Applications*. Woodbury, N.Y. : Acoustical Society of America, latest edition.
3. Fahy F., *Sound Intensity*. London : E & FN Spon, latest edition.
4. Koopmann G. H., *Designing Quiet Structures: A Sound Power Minimization Approach*. San Diego : Academic Press, latest edition.
5. Crocker M. J. (editor), *Handbook of Acoustics*. New York : Wiley, latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME576</td></tr>
<tr><td>Subject Title</td><td>Turbulent Flows and Aerodynamics</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>Students should have basic knowledge in fundamental fluid mechanics.

Exclusion: ME568 Flow System Design and Analysis</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of advanced fluid mechanics and aerodynamics knowledge.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge in the area of advanced fluid dynamics, typical engineering flows and aerodynamics;
b. apply their knowledge, skills and hand-on experience, gained from the subject, to the design and analysis of engineering flow and aeronautical systems;
c. extend their knowledge of mechanical engineering to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>A Review of Kinematics and Dynamics of Flow Fields: Eulerian and Lanrangian descriptions; rotational and irrotational flows; acceleration of a fluid particle; Euler’s equation; Bernoulli’s equation; conservation equations of mass; momentum and energy.

Time-averaged Conservation Equations: Reynolds-averaged equations of mass; momentum and energy conservations; turbulence modelling: large-eddy simulation, eddy-viscosity hypothesis, mixing length models and two equation transport models.

Typical Turbulent Flows: Wakes of bluff bodies, plane and round jets, mixing layers, boundary layers, pipe and channel flows.

Compressible Flows: Subsonic compressible flows. Transonic, supersonic and hypersonic flows. Stagnation properties; one-dimensional isentropic flow; isentropic flow through nozzles; shock waves and expansion waves.

Aerodynamic Characteristic of Airfoils and Wings: Vortex street; vortex street in thin-airfoil theory; properties of the symmetrical airfoil; properties of the cambered airfoil; flapped airfoil. Wings of finite span: lift, drag, lift/drag ratio.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for flow and aerodynamic system design and analysis.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Case study report and presentation	20%	√	√	√	
3. Examination	60%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Cengel Y A, Cimbala J M, *Fluid Mechanics: Fundamentals and Applications*. McGraw Hill, latest edition.
2. Kuethe A M, Chow C-Y, *Fundamentals of Aerodynamics: Bases of Aerodynamic Design*, John Wiley & Sons, Inc. latest edition.
3. Rathakrishnan E, *Gas Dynamics*, PHI Learning Private Ltd., latest edition.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME577</td></tr>
<tr><td>Subject Title</td><td>Advanced Aircraft Structures</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>Exclusion: AAE5202 Advanced Aircraft Structures and Materials</td></tr>
<tr><td>Objectives</td><td>To provide students the key knowledge relevant to the structures and composite materials in aircraft; to provide students with tools of stress analysis to formulate and solve engineering problems in aircraft structures.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. demonstrate a good understanding of key aspects of aircraft structures, components and systems;
b. analyze an aircraft structure subject to a combined state of loading using stress analysis tools;
c. apply failure criteria to analyze an aircraft structure subject to loading;
d. formulate and solve problems concerning compression/tension, bending, torsion and buckling in aircraft structures;
e. understand mechanical behaviors of composites used in aircraft;
f. analyze the effects of various loads or displacement boundary conditions on aircraft structures; and
g. gain appreciation of the wide design flexibility composites in aircraft.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Characteristics of Aircraft Structures and Materials: Structural elements in aircraft. Wing, fuselage, tail and landing gear. Aircraft materials.
Elasticity: Stress and strain. Equations of equilibrium. Principal stresses. Linear stress-strain relations. Elastic strain energy. St. Venant’s principle. Thin plate theory.
Loads Applied on Aircraft: Compression/tension. Torsion. Bending. Closed single-cell thin-walled sections. Transverse shear stress. Flexural shear in thin-walled sections and in open thin-walled section. Buckling of columns. Aircraft structures under combined loading.
Failure Criteria for Isotropic Materials: Strength criteria for brittle materials. Yield criteria for ductile materials. Fracture mechanics. Stress intensity factor. Fatigue.
Aircraft Composites: Classification and characteristics of composite materials. Mechanical behavior of composite materials. Interface properties. Processing and Fabrication techniques for aircraft composites. Analysis of Lamina and Laminates Failures of composites.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures are used to deliver the fundamental knowledge in relation to aircraft structures and composites (outcomes a to g).
Tutorials are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to g).
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="7">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td></tr>
<tr><td>Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed						
		a	b	c	d	e	f	g
1. Examination	50%	√	√	√	√	√	√	√
2. Assignment and test	50%	√	√	√	√	√	√	√
Total	100%							

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by continuous assessment including assignments and closed-book tests. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

All assigned homework inclusive of any computer problems should be worked independently. It is the students' responsibilities to work out the problems individually and to ask questions on those problems they have difficulty with. Unless stated otherwise, no group submission or copies are permitted. If a copy is detected, a zero score will be assigned.

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case Study	15 Hrs.
Other student study effort:	
▪ Course work	42 Hrs.
▪ Self-study	25 Hrs.
Total student study effort	106 Hrs.

Reading List and References

1. C.T. Sun, Mechanics of Aircraft Structures, John Wiley & Sons, 1998.
2. T.H.G. Megson, Aircraft Structures for Engineering Students, Elsevier, 2007.
3. R.F. Gibson, Principles of Composite Material Mechanics, McGraw-Hill International Editions, 1994.
4. I. Moir and A.G. Seabridge, Design and Development of Aircraft Systems – An Introduction, AIAA Education Series, 2004.

Subject Description Form

Subject Code	ME578
Subject Title	Aircraft Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: AAE5203 Aircraft Design and Certification
Objectives	To provide students with the key knowledge relevant to the process and principle of flight vehicle design, and the capacity to formulate the design requirements for a flight vehicle using modern engineering tools; to provide students with the opportunity to conduct flight vehicle system design studies from aerodynamics, propulsion, structure, stability, and performance perspectives; to develop management skills in teamwork and develop skills in carrying out detailed design tasks.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand fundamental concepts and constraints during a flight vehicle design process; b. evaluate common flight vehicle configurations; c. design and layout flight vehicle major components; d. understand aerodynamic, structural and engine characteristics; e. identify key design features of different types of flight vehicles; f. design and sizing flight vehicles that meets certain requirements; g. develop a simple design program; h. understand airworthiness and safety;
Subject Synopsis/ Indicative Syllabus	***Introduction to Aircraft Design:*** Design method and basic requirements. Evolution of aircraft design and its performance: a brief history. Overview of aircraft design cycle and process. ***Aircraft Configuration:*** Advantages and drawbacks of conventional and alternative configurations. Considerations for special aircraft. Primary considerations for fuselage, wing, and tail design. ***Jet propulsion:*** Basic considerations in the analysis of jet propulsion. Gas-turbine engines. Inter-cooling. Reheating. Regeneration. Ideal jet-propulsion cycles. Modifications to turbojet engines. ***Aerodynamic consideration of aircraft design:*** Fundamentals of aerodynamics. Flow separation. Friction and pressure drag. Parallel flow over flat plate and wings. Airfoils. Finite wings. Drag and lift. Lift-to-drag ratio. Dependence of lift and drag on the angle of attack. Flapped airfoils. End effects of wing tips. Induced drag. ***Structural consideration of aircraft design:*** Fundamentals of aerospace structures. Airframe basics. Aerospace materials. Stiffened panels. Trusses. Buckling. ***Sizing and Costing:*** Internal layout. Structures and weight. Geometry constraints. Sizing equation. Weight fraction method. Weight and balance. Cost analysis. Elements of life-cycle cost. Cost-estimating methods. Operations and maintenance costs. Cost measures of merit. ***Main Components Selection and Design:*** Selection and design of main components such as fuselage, wing, tail, and landing gear. Calculation and design of control surfaces such as aileron, elevator, and rudder. ***Airworthiness and Safety:*** Airworthiness requirements. Load factor determination. Aircraft safety. Airframe loads. Designing against fatigue. Prediction of aircraft fatigue life. ***Project practice:*** A design project will be carried out for students to learn the aircraft

	design process through practice.
Teaching/Learning Methodology	Lectures are used to deliver the fundamental knowledge in relation to aircraft design (outcomes a to h). Tutorials are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to h).

Teaching/Learning Methodology	Intended subject learning outcomes							
	a	b	c	d	e	f	g	h
Lecture	√	√	√	√	√	√	√	√
Tutorial	√	√	√	√	√	√	√	√
Final examination	√	√		√	√			√
Design 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	f	g	h
1. Design project 1	25 %	√	√			√		√	
2. Design project 2	25 %			√	√		√		√
3. Design project presentation	10 %	√	√	√	√	√	√	√	√
4. Final examination	40 %	√	√		√	√			√
Total	100 %								

Overall Assessment:
0.6 x Continuous Assessment + 0.4 x End of Subject Examination

The group project is used to assess all aspects of the course content as well as the students' capacities of self-learning and problem-solving and effective communication skill in English so as to fulfill the requirements of being aircraft design engineers.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Tutorial/Case Study	15 Hrs.
	Other student study effort:	
	▪ Course work	42 Hrs.
	▪ Self-study	25 Hrs.
	Total student study effort	106 Hrs.

Reading List and References

1. D. Raymer, Aircraft Design: A Conceptual Approach. American Institute of Aeronautics and Astronautics, Inc., 2018.
2. S.A. Brandt, *et al*., Introduction to Aeronautics: A Design Perspective, American Institute of Aeronautics and Astronautics Inc., 2015.
3. J. Anderson, Introduction to Flight. McGraw Hill, 2015.

Revised April 2022

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME579</td></tr>
<tr><td>Subject Title</td><td>Aircraft Noise and Aeroacoustics</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>Students must have fundamental knowledge in fluid mechanics or aerodynamics.
Fundamental knowledge in acoustics is preferred.</td></tr>
<tr><td>Objectives</td><td>To provide students in-depth knowledge of the noise generation mechanisms of aircraft noise and its environmental issues. Analysis using aeroacoustic theory will be introduced.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of aircraft noise;
b. apply their knowledge, skills and hand-on experience to analyze the noise generation of key aircraft components, its radiation and environmental consequences;
c. extend their ability to integrate various noise suppression techniques in achieving quiet design and operation of aircraft ; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Noise Radiation from Aircraft: Aircraft noise descriptors. Human response to aircraft noise. Actions against aircraft noise. Noise certification and regulation.
Introduction to Aeroacoustic Theory: Equation of linear acoustics. Free-space Green’s function. Acoustics of point sources. Lighthill’s acoustic analogy and its extensions. Acoustics of turbulence near a rigid body. Radiation from compact and non-compact sources. Fuselage dynamics and cabin noise.
Noise Source Mechanisms: Airframe noise. Propeller noise. Fan and compressor noise. Turbine noise. Jet noise. Combustor noise. Interior noise.
Noise Control: Noise control at sources. Cabin noise control. Quiet aircraft design and operational characteristics. Quiet airport operation.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for understanding and analysis of aircraft noise.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</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. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation or Laboratory	10%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. Crighton, D. G., Dowling, A. P., Ffowcs Williams, J. E., Heckl, M., Leppington, F. G., *Modern Methods in Analytical Acoustics – Lecture Notes*, Springer, latest edition.
2. Goldstein, M. E., *Aeroacoustics*, McGraw-Hill, latest edition.
3. Howe, M. S., *Theory of Vortex Sound*, Cambridge University Press, latest edition.
4. Hubbard, H. H. (Ed.), *Aeroacoustics of Flight Vehicles – Theory and Practice, Vols. 1 & 2*, Acoustical Society of America, latest edition.
5. Nelson, P. M. (Ed.), *Transportation Noise Reference Book*, Butterworths, latest edition.
6. Pierce, A. D., *Acoustics – An Introduction to Its Physical Principles and Applications*, Acoustical Society of America, latest edition.
7. Smith, M. J. T., *Aircraft Noise*, Cambridge University Press, latest edition.

Journals:

1. *AIAA Journal*, American Institute of Aeronautics and Astronautics.
2. *International Journal of Aeroacoustics*, Multi-Science.
3. *Journal of the Acoustical Society of America*, Acoustical Society of America.
4. *Journal of Sound and Vibration*, Academic Press.

Subject Description Form

Subject Code	ME591
Subject Title	Dissertation
Credit Value	9
Level	5
Pre-requisite / Co-requisite/ Exclusion	Consent of Project Supervisor and endorsement of Dissertation Coordinator should be obtained before subject registration.
Objectives	To develop analytical and research skills to design and implement practitioner research in mechanical engineering or related fields.
Intended Learning Outcomes	Upon completion of the dissertation, students will be able to: a. demonstrate an understanding of relevant literature in the topic area selected; b. develop critical thinking and analytic evaluation skills through planning and implementing a research project; c. demonstrate the ability to enhance and apply advanced knowledge to solve complex engineering problems; d. communicate effectively the dissertation process, results, experience and reflection coherently, logically and precisely, using written, oral, and visual media.
Subject Synopsis/ Indicative Syllabus	The student may select, plan and conduct a research project in mechanical engineering or related field, subject to the availability of supervisor(s) and their research interests and background. The research area should be in line with the student's overall design of his/her chosen programme of study and choice of subjects.
Teaching/Learning Methodology	A topic for research will be mutually agreed upon between the student and project supervisor(s). The student will read widely on the scientific issues and, in specific areas, also in depth under the guidance of the supervisor(s). The student shall contact his/her project supervisor(s) from time to time to discuss the research progress and observations. The project supervisor(s) will provide guidance to the student and advice on the style of dissertation presentation, etc. The project supervisor(s) will be available for consultation at the University/at the student's workplace according to circumstances.

<table>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Progress</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Oral Exam</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Dissertation</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Meeting and Oral Presentation</td><td>20 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Project/Research work</td><td>300 Hrs.</td></tr>
<tr><td>▪ Dissertation writing</td><td>100 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>420 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

1. Grote, K. H., & Hefazi, H. (Eds.). (2021). *Springer handbook of mechanical engineering*. Springer Nature.
2. Davim, J. P. (Ed.). (2018). *Introduction to mechanical engineering*. Springe r.
3. Stewart, R. (2022). *How to do research: And how to be a researcher*. Oxfor d University Press.
4. Calabrese, R. L. (2012). *Getting it right: The essential elements of a disserta tion*. Rowman & Littlefield.
5. Randolph, J. (2019). *A guide to writing the dissertation literature review*. Pr actical assessment, research, and evaluation, 14(1), 13.

</td></tr>
<tr><td>Develop Date</td><td>January 2024</td></tr>
</table>

Subject Description Form

Subject Code	ME5201
Subject Title	Hydrogen and Fuel Cells
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To understand the importance of the use of hydrogen energy in solving energy and environmental problems we are facing. 2. To provide students with fundamental knowledge of hydrogen production and utilization technologies. 3. To design and analyze fuel cell application systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) understand concepts and components of hydrogen production technologies. b) apply the fundamental knowledge of hydrogen production technologies for applications and innovations. c) obtain comprehensive knowledge and skills on fuel cell technologies. d) design and evaluate fuel cell systems. e) have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Introduction***: renewable energy resources and utilization, climate change, energy conversion and storage; carbon-neutral goal ***Hydrogen***: hydrogen economy; hydrogen energy; conventional hydrogen production technologies; grey hydrogen; blue hydrogen; green hydrogen; water electrolysis; electrolytic cell; alkaline liquid electrolyte water electrolysis; proton exchange membrane water electrolysis; photocatalysis and photoelectrochemical cells for hydrogen production; hydrogen storage and utilization ***Fuel cell technologies:*** thermodynamics and kinetics; electrochemical cells; classifications; working principles; basic components; nanomaterials and catalysts; reaction mechanisms; porous electrodes; membranes; membrane electrode assemblies; bipolar plates; cell designs; proton exchange membrane fuel cells; direct alcohol fuel cells; single-cell and stack

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, in-class tests, report & presentation, and final examination.

2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for hydrogen and fuel cells.

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

Teaching/Learning Methodology	Intended subject learning outcomes				
	a	b	c	d	e
1. Lecture	✓	✓	✓	✓	✓
2. Tutorial	✓	✓	✓	✓	
3. Report & presentation		✓		✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. In-class tests	20%	✓	✓	✓	✓	
2. Homework	10%	✓	✓	✓	✓	
3. Project	20%		✓		✓	✓
4. Examination	50%	✓	✓	✓	✓	
Total	100 %					

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

Overall Assessment:

0.50 × Examination + 0.50 × Continuous Assessment

1. The continuous assessment will comprise three components: homework assignment (10%), team project (20%) and several in-class tests (20%). They are aimed at evaluating their understandings on hydrogen and fuel cell systems and enhancing the integration of their knowledge learnt.
2. The examination (50%) will be used to assess the knowledge acquired by the students for understanding and analysing the problems critically and independently, and to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial	9 Hrs.
	Other student study effort:	
	▪ Self-learning	55 Hrs.
	▪ Report and presentation	21 Hrs.
	Total student study effort	115 Hrs.
Reading List and References	*Books*: A.L. Dicks, D.A.J. Rand, *Fuel Cell Systems Explained*, Wiley, latest edition. J. Newman, K.E. Thomas-Alyea, *Electrochemical Systems*, Wiley, latest edition. *Journals*: *International Journal of Hydrogen Energy*, Elsevier. *Journal of Power Sources*, Elsevier. *Fuel Cells*, Wiley. *Journal of Fuel Cell Science and Technology*, The American Society of Mechanical Engineers (ASME). *Applied Energy*, Elsevier.	

July 2023

Subject Description Form

Subject Code	ME5202
Subject Title	Solar and Wind Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To understand the importance and global trend of solar and wind energy in solving the energy and environmental problems we are facing. 2. To provide students with fundamental knowledge of solar and wind resources, energy conversion principles, solar and wind system designs and operations. 3. To enable students to design and analyze solar, wind, and hybrid energy systems using scientific coding tools such as Python and MATLAB.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) understand the concepts and components of solar and wind resources and systems; b) apply the fundamental knowledge of solar and wind engineering for applications and innovations; c) design and evaluate different types of solar and wind energy systems using Python or MATLAB; d) obtain comprehensive knowledge and skills on selected topics in solar and wind engineering. e) have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Introduction***: renewable energy resources; global trend; solar and wind technologies; environmental impacts; overview of related heat and mass transfer topics. ***Wind Energy:*** wind characteristics; extraction characteristics; wind turbines; wind farm aerodynamics; power generation; on-shore and off-shore wind farms. ***Solar Energy:*** solar radiation; radiation characteristics of materials; photovoltaic applications; solar thermal applications. ***Energy Storage:*** sensible and latent heat storage; chemical energy storage; battery storage; hydroelectric and compressed air. ***Grid Planning and Operations:*** renewable power integration into power grid and its related issues; micro grid; smart grid; power dispatching; distributed generation and automation system. ***Solar and Wind Forecasting:*** impact of solar and wind forecasting on grid management; forecasting basics; physical and data - driven

forecasting methodologies.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures sessions, homework assignments, project, site visit and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for solar and wind engineering.
3. Technical/practical examples and problems will be raised and discussed in lecture sessions.
4. A team project with report and presentation will be used to enhance students' understanding of the subject contents and practice presentation skills.
5. A site visit to a solar and wind farm will further provide an opportunity for students to understand the various components of a commercial solar and wind system as well as the operations of such system.

Teaching/Learning Methodology	Intended subject learning outcomes				
	a	b	c	d	e
1. Lectures	✓	✓	✓	✓	✓
2. Homework assignment	✓	✓	✓		
3. Project report and presentation			✓	✓	✓
4. Site visit				✓	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Homework	20%	✓	✓	✓		
2. Project	30%				✓	✓
4. Examination	50%	✓	✓	✓		
Total	100 %					

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

Overall Assessment:

0.50 × Examination + 0.50 × Continuous Assessment

1. The continuous assessment will comprise two components: team project (30%)and homework (15%). The team projectand homework are aimed at evaluating their understandings on solar and wind systems and enhancing the integration of their knowledge learnt.
2. The examination (50%) will be used to assess the knowledge acquired by the students for understanding and analysing the problems critically and independently, and to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Presentation	6 Hrs.
	Other student study effort:	
	▪ Project/Assignments	60 Hrs.
	▪ Self-study	20 Hrs.
	▪ Site visit	6 Hrs.
	Total student study effort	125 Hrs.
Reading List and References	Duffie J.A. and Beckman W.A., *Solar Engineering of Thermal Processes, Photovoltaics and Wind*, Wiley, latest edition. Rosa A.V. and Ordonez J.C., *Fundamentals of Renewable Energy Processes*, Elsevier Science, latest edition. Petela R., *Engineering Thermodynamics of Thermal Radiation: for Solar Power Utilization*, McGraw Hill, latest edition. Smets A. H., Jäger K., Isabella O., Swaaij, R. A. and Zeman M., *Solar Energy: The Physics and Engineering of Photovoltaic Conversion, Technologies and Systems*, UIT Cambridge Ltd., latest edition. Nelson V. and Starcher K., *Introduction to Renewable Energy*, CRC Press, Taylor & Francis Group, latest edition. Letcher T.M., *Wind Energy Engineering: A Handbook for Onshore and Offshore Wind Turbines*. Academic Press, latest edition. Agarwal P., Mittal M., Ahmed J. and Idrees S.M., *Smart Technologies for Energy and Environmental Sustainability*. Springer, latest edition. <u>Journals:</u> 1. Solar Energy, Elsevier Science Ltd. 2. Renewable Energy, Elsevier Science Ltd. 3. Energy, Elsevier Science Ltd. 4. Renewable and Sustainable Energy Reviews, Elsevier Science Ltd. 5. Journal of Renewable and Sustainable Energy, AIP Publishing Ltd.	
Last Update	July 2024	

Subject Description Form

Subject Code	ME5203
Subject Title	Green Combustion
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Thermodynamics.
Objectives	1. To provide knowledge about the state-of-the-art green combustion technologies; the basics of thermodynamics and chemical kinetics in green combustion; the fundamentals of various ideal reactors to investigate chemical kinetics in combustion; the modelling of ideal reactors; and the computation of thermochemical and kinetic parameters. 2. To provide hands-on training on kinetic combustion modelling and quantum chemistry computation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. contribute to their professional competence in the area of green combustion, from both fundamental and practical perspectives; b. provide solutions for real combustion problems from molecular level to practical applications; c. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	**Green combustion technologies**: review of combustion pollutants and their environmental impact; green combustion strategies and green fuels to mitigate combustion environmental effects **Thermodynamics and chemical kinetics in green combustion**: collision theory; reaction theory; reaction rate order and reaction rates; chemical thermodynamics and equilibrium; simple and complex kinetic systems **Ideal reactors**: constant volume closed reactors; perfectly-stirred reactors; plug-flow reactors; governing equations and conservation laws; experimental set-up and control; advantages and limitations **Modelling of ideal reactors**: chemical kinetic effects; thermodynamic effects; transport effects; modelling software review **Computation of thermochemical and kinetic parameters**: statistical mechanics and molecular dynamics; electronic structure theory; group additivity; transition state theory and semi-classical treatments; master equation; modelling software review

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial/laboratory sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for green combustion applications.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Specific assessment methods/tasks	Intended subject learning outcomes		
	a	b	c
1. Lecture	√	√	√
2. Tutorial/Laboratory	√	√	√
3. Homework assignment	√	√	√
4. Case study report and presentation	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Homework assignment	20%	√	√	√
2. Test	10%	√	√	
3. Case study report and presentation	20%	√	√	√
4. Examination	50%	√	√	√
Total	100 %			

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

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

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

Student Study Effort Expected	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Tutorial/Case study/Laboratory	15 Hrs.
	Other student study effort:	
	▪ Self-study	55 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	115 Hrs.
Reading List and References	Books: 1. Battin-Leclerc, F., Simmie, J. M., & Blurock, E. *Cleaner Combustion*, Springer International Publishing AG, latest edition. 2. Wright, M. R. *Introduction to Chemical Kinetics*. John Wiley & Sons, latest edition. 3. Lee, S., Speight, J. G., & Loyalka, S. K. (Eds.). *Handbook of Alternative Fuel Technologies*. CRC Press, latest edition. 4. Kauzmann, W. *Quantum Chemistry: An Introduction*. Elsevier, latest edition. 5. Turns S. R., *An Introduction to Combustion: Concepts and Applications*, McGraw-Hill, latest edition. Journals: 1. Combustion and Flame 2. Proceedings of the Combustion Institute 3. International Journal of Chemical Kinetics 4. Energy 5. Fuel 6. Energy & Fuels 7. Physical Chemistry Chemical Physics	
Last Update	January 2024	

Subject Description Form

Subject Code	ME5205
Subject Title	Advanced Energy Storage Technologies
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in thermofluids and electrochemistry.
Objectives	1. To enable students to establish a broad concept of energy storage. 2. To provide students with knowledge of advanced energy storage technologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. recognize the significance and benefits of energy storage. b. describe the underpinning principles and characteristics of different energy storage technologies. c. evaluate the performance and identify the limitations of various energy storage technologies. d. have recognition of the need for, and an ability to engage in life-long learning.
	Renewable Energy and Energy Storage: energy and sustainability; renewable energy sources and characteristics; role of energy storage; classifications of energy storage technologies. ***Mechanical Energy Storage:*** Pumped storage hydropower; compressed air energy storage; flywheel energy storage. ***Thermal Energy Storage:*** Sensible heat storage; latent heat storage; thermo-chemical energy storage. ***Electrochemical Energy Storage:*** lead-acid batteries; lithium-ion batteries and beyond; molten-salt batteries; redox flow batteries; metal-air batteries. ***Chemical Energy Storage:*** hydrogen storage; liquid fuel storage.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report/presentation and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for energy storage technologies.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes to be assessed			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Tutorial	✓	✓	✓	
3. Homework assignment	✓	✓	✓	
4. Case study report and presentation	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/ tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Test	10%	✓	✓	✓	
2. Homework assignment	20%	✓	✓	✓	
3. Case study report and presentation	20%	✓	✓	✓	✓
4. Examination	50%	✓	✓	✓	
Total	100%				

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

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

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

Student Study Effort Expected	Class contact:	
	▪ Formal lecture	24 Hrs.
	▪ Tutorial/case study	15 Hrs.
	Other student study effort:	
	▪ Self-study	55 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	115 Hrs.
Reading List and References	1. Huggins R.A., *Energy Storage*, Springer, latest edition. 2. Dincer I. and Rosen M., *Thermal Energy Storage: Systems and Applications*, Wiley, latest edition. 3. Barnes F.S. and Levine J.G., *Large Energy Storage Systems Handbook*, CRC Press, latest edition. 4. Tarascon J.M. and Simon P., *Electrochemical Energy Storage*, Wiley-ISTE, latest edition. 5. Brun K., Allison T.C. and Dennis R., *Thermal, Mechanical, and Hybrid Chemical Energy Storage Systems*, Academic Press, latest edition. 6. Sahoo U., *Energy Storage (Advances in Renewable Energy Series)*, Wiley-Scrivener, latest edition. 7. Jeguirim M., *Recent Advances in Renewable Energy Technologies*, Volume 1, Elsevier, latest edition. 8. Ting D. and Stagner J.A., *Compressed Air Energy Storage: Types, systems and applications*, The Institution of Engineering and Technology, latest edition. <u>*Journals*</u> • Journal of Energy Storage, Elsevier Science Ltd. • Energy Conversion and Management, Elsevier Science Ltd. • Energy, Elsevier Science Ltd. • Applied Thermal Engineering, Elsevier Science Ltd. • International Journal of Energy Research, John Wiley & Sons, Inc. • IEEE Power & Energy Magazine, IEEE. • Journal of Electrochemical Energy Conversion and Storage, American Society of Mechanical Engineers, USA.	

July 2023

Subject Description Form

Subject Code	ME5206
Subject Title	Advanced Materials for Clean Energy
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students are expected to have fundamental knowledge about materials and chemistry.
Objectives	1. To enable students to establish a general concept on the state-of-art clean technologies in renewable energy. 2. To enable students to establish a general concept on the advanced material preparation and characterization for sustainable energy storage and conversion. 3. To provide in-depth knowledge on the typical materials and their specific characteristics and performances towards renewable energy storage and conversion. 4. To enable students to know the practical application scenarios of clean energy.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a have state-of-the-art knowledge of advanced materials and advanced material design and synthesis for clean energy storage and conversion; b apply their knowledge, skills, and hands-on experience to design advanced materials for energy storage and conversion and improve their performances; c. extend their knowledge of the clean energy and material design to different situations of energy context and professional practice; and d. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Introduction***: The development of renewable energy technologies; world resources and environmental considerations *versus* materials' selection; future trends in clean energy technology. ***Synthesis and Processing of Sustainable Materials***: Types of sustainable materials; materials structures; materials synthesis and characterization. ***Advanced Materials for Metal-ion Battery***: Cathode materials for Li-ion battery; anode materials for Li-ion battery; Na-ion battery. ***Advanced Materials for Solar Cells***: The principles of solar cells; materials for advanced solar cells including Si-solar cells, dye-sensitized solar cells, organic-inorganic hybrid materials, and perovskite solar cells. ***Advanced Materials for Fuel Cells***: The anode and cathode catalysts for H_2/O_2 fuel cells. ***Advanced Materials for Electrochemical Water Splitting***: Advanced materials for cathodic H_2 production; advanced materials for anodic O_2 production; full cell for water splitting.

Advanced Biomass and Their Applications: Biomass conversion technologies; corrosion resistant materials compatible with biofuels; catalysts for conversion of biomass to biofuel; coal liquefaction.

Advanced Materials for CO_2 Capture and Conversion: Solid sorbents for CO_2 capture; liquid sorbents for CO_2 capture; photo/electro-catalysis for CO_2 conversion.

Teaching/Learning Methodology

The main fundamental principles and key concepts of the subject will be delivered to students through lectures. The tutorials will be provided as complemented protocols to help students to have a deeper understanding of the lecture material. Laboratory visit will be provided to strengthen students' understanding and obtain a real experience on the materials design for energy storage and conversion. Assignments, in-class assignments will be used to evaluate students' ability in applying concepts and skills learned in the classroom.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lecture	√	√	√	√
2. Tutorial	√	√	√	
3. Laboratory visit	√	√	√	√
4. Assignment	√	√	√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	20%	√	√	√	
2. Test	20%	√	√	√	√
3. Case study report & presentation	10%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

0.5 × End of Subject Examination + 0.5 × Continuous Assessment

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

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

Student Study Effort Expected	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Tutorial/Case study/Laboratory/Presentation	15 Hrs.
	Other student study effort:	
	▪ Self-Study	55 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	115 Hrs.
Reading List and References	**Textbooks:** 1. Bandarenka A.S., *Energy Materials: A Short Introduction to Functional Materials for Energy Conversion and Storage*, CRC Press, latest edition. 2. Liu J. L. and Bashir S., *Advanced Nanomaterials and Their Applications in Renewable Energy*, Elsevier, latest edition. 3. Shen P. K., Wang C. Y., Jiang S. P., Sun X. L. and Zhang J. J., *Electrochemical Energy, Advanced Materials and Technologies*, Taylor & Francis Group, latest edition. 4. Cheong K. and Apblett A., *Sustainable Materials and Green Processing for Energy Conversion*, Elsevier, latest edition. 5. Tong C., *Introduction to Materials for Advanced Energy Systems*, Springer, latest edition. 6. Dhoble S., Kalyani N., Vengadaesvaran B. and Arof A., *Energy Materials: Fundamentals to Applications*, Elsevier, latest edition. **Journals:** 1. Joule, Cell press. 2. Advanced Energy Materials, John Wiley & Sons. 3. Energy & Environmental Science, Royal Society of Chemistry.	

July 2023

Subject Description Form

Subject Code	ME5207
Subject Title	Electrochemical Energy Conversion Materials and Devices
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: Basic knowledge in mechanical engineering or chemical Engineering or electrical engineering or material engineering. Exclusion: ME5204 Batteries and Capacitors
Objectives	To provide students with knowledge of electrochemical energy storage devices and their functional materials
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. have the knowledge of the electrochemical fundamentals, electrochemical energy conversion material, electrochemical energy conversion devices (batteries and capacitors) and their management. b. understand the current trend of the battery and capacitor research and development areas. c. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Electrochemistry basics:*** electrochemical reactions; electrochemical thermodynamics; introduction to kinetics ***Electrochemical batteries and materials:*** working principles; battery classification; battery materials; characterization techniques; current development trend. ***Electrochemical capacitor and materials:*** working principles; capacitor materials; characterization; and current development trend. ***Battery development and management:*** typical battery development process from material to electrode, cell, pack, and battery; introduction to control and management.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorials, homework assignments, test, case study presentation and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for electrochemical batteries and capacitors.
3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.

Teaching/Learning methodology	Intended subject learning outcomes		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	
3. Homework assignments/test/examination	✓	✓	
4. Case study report and presentation	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignment	15%	✓	✓	
2. Test	20%	✓	✓	
3. Case study report and presentation	15%	✓	✓	✓
4. Examination	50%	✓	✓	
Total	100 %			

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

Overall Assessment:

0.50 x End of Subject Examination + 0.50 x Continuous Assessment

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

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

Student Study Effort Expected	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Tutorial/Case study	15 Hrs.
	Other student study effort:	
	▪ Self-study	45 Hrs.
	▪ Case study preparation and presentation	21 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	**Textbooks:** Cornelia Breitkopf, Karen Swider-Lyons, Handbook of Electrochemical Energy, Springer, 2017 J.-M. Tarascon and P. Simon, Electrochemical Energy Storage, Wiley, 2015 S. Passerini, D. Bresser, A. Morretti, and A. Varzi, Batteries, Willey-VCH, 2020 S. Kumugai and D. Tashima, Electrochemical Capacitors, MDPI, 2020 M. K. Gulbinska, Lithium-ion Battery Materials and Engineering, Springer, latest version J. T. Warner, The handbook of lithium-ion battery pack design, Elsevier, latest version G. Plett, Battery Management Systems: Volume 1, Battery Modelling, Artech, latest version K. Kanamura, Next Generation Batteries, Springer, 2021 **Journals:** Nature Energy, Nature Publishing Group. Journal of Power Sources, Elsevier Science Ltd. Journal of Electrochemical Society, Electrochemical Society. Electrochimica Acta, Elsevier Science Ltd.	
Last Update	**July 2024**	

Subject Description Form

Subject Code	ME5510
Subject Title	Thermal Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in Thermofluids
Objectives	To provide students with knowledge of engineering thermodynamics and heat transfer; to enable the students the ability of modeling, analyzing and solving the practical problems in thermal engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess state-of-the-art knowledge and skills in the area of thermal science and engineering, be able to apply their knowledge and skills in designing and developing products or engineering systems; b. think critically and holistically in dealing with thermal problems, and generate practical solutions; and c. recognize the need for, and engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Engineering Thermodynamics:*** Introduction to thermodynamics and applications; Systems; Properties; Extensive and intensive properties; Measured properties; Energy; Equilibrium; Zeroth law of thermodynamics; State and state principle; Process and cycle; Quasiequilibrium process; Pure substances; Phase-change process; Property diagrams; Critical point and critical properties; Enthalpy; Property tables; Reference state; State equations for vapor phase; Ideal gases; Heat and work; Adiabatic processes; Mechanical forms of work; Polytropic processes; Specific heats; Internal Energy and enthalpy; First law of thermodynamics; Energy balance; Control volumes; Conservation of mass; Conservation of energy; Flow work and total energy of a flowing fluid; Steady-state and unsteady-flow processes; Applications in nozzles, diffusers, turbines, compressors, values, mixing chambers and heat exchangers; Thermal reservoirs; Power cycles; Efficiency; Refrigeration and heat pump cycles; Coefficients of performance; The Kelvin-Planck statement; The Clausius statement; Reversible and irreversible processes; Carnot principle; The Carnot cycle; Thermodynamic temperature scale; Maximum performance measures for cycles; Quality of energy; Clausius inequality; Entropy; Thermal entropy flux and entropy production; Entropy of substances; Entropy changes; Entropy balance for closed systems; Principle of entropy increase; Entropy rate balance for open systems. ***Heat Transfer:*** Heat; Conduction and convection; Fourier law of heat conduction; Thermal conductivity; Heat conduction equation; Newton law of cooling; Convective heat transfer coefficient; Non-dimensional numbers; Double-pipe heat exchangers; Shell-and-tube heat exchangers; Cross-flow heat exchangers; Overall heat-transfer coefficient; Log mean temperature difference; Effectiveness-NTU method; Design and applications.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for thermal science and engineering.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lecture	√	√	√
2. Tutorial	√	√	√
3. Homework assignment	√	√	√
4. Project report and presentation	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignment	20%	√	√	√
2. Test	20%	√	√	
3. Projectreport and Presentation	20%	√	√	√
4. Examination	40%	√	√	√
Total	100%			

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

Overall Assessment:

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	36 Hrs.
▪ Tutorial/Case study	3 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Project report preparation and presentation	26 Hrs.
Total student study effort	110 Hrs.

Reading List and References	1. Cengel Y. A. and Boles M. A., *Thermodynamics: An Engineering Approach*, McGraw-Hill, latest edition. 2. Holman J. P., *Heat Transfer*, McGraw-Hill, latest edition. 3. Cengel Y. A., *Heat Transfer: A Practical Approach*, McGraw-Hill, latest edition. 4. Morris W. D., *Heat Transfer and Fluid Flow in Rotating Coolant Channels*, Wiley, latest edition. 5. Han J. C., Datta S., Ekkad S., *Gas Turbine Heat Transfer and Cooling Technology*, CRC Press/Taylor & Francis, latest edition. 6. Yeh L.T. and Chu R. C., Thermal Management of Microelectronic Equipment: Heat Transfer Theory, Analysis Methods, and Design Practices, ASME Press, latest edition. 7. Patankar S. V., *Numerical Heat Transfer and Fluid Flow*, McGraw-Hill, latest edition. 8. Fletcher C. A. J., Computational Techniques for Fluid Dynamics: A Solutions Manual, Springer-Verlag, latest edition.
Last Update	June 2024

Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME5610</td></tr>
<tr><td>Subject Title</td><td>Air Pollution Engineering</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>Students should have basic knowledge in Thermofluids and Air Pollution.

Exclusion: ME539 Treatments of Dust, Fume and Wastewater</td></tr>
<tr><td>Objectives</td><td>To provide the student with an in-depth understanding of the working principles and design features of air pollution control devices.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of air pollution control;
b. apply their knowledge, skills and hand-on experience to evaluate different methods for reducing gaseous emission and reducing particulate emission;
c. extend their knowledge of air pollution control to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Nature of Gaseous and Particulate Pollutants in Air: Nature and composition of the atmosphere. Sources of air pollutants. Common gaseous pollutants in air and their chemical properties. Common particulates in air. Physical and chemical properties of aerosols.

Principles and Design of Gaseous Pollution Control Devices: Processes for removal of pollutant gases and vapours. Adsorption: adsorption material, breakthrough time, adsorption zone velocity, regeneration. Absorption: packed bed scrubber, mass transfer process, NTU and HTU. Catalytic converter: catalysts, catalyst requirements for different applications, typical catalytic reactions for reducing pollutants. Design of absorber, absorber and catalytic converter.

Principles and Design of Particulate Control Devices: Motion of particles: drag forces, equations of particle motion, settling velocity. Filters: surface filter and depth filter, filtering mechanisms, determination of filtering efficiencies. Cyclones: axial flow and tangential flow cyclones, equations governing motion of particles in the cyclone, determination of collection efficiency. Electrostatic precipitation: principle of electrostatic precipitation, equations governing motion of particles in electrostatic precipitator, determination of collection efficiency. Air purifiers: analysis of the design and function of air purifiers.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for air pollution control devices.
3. Technical/practical examples and problems will be raised and discussed in class/tutorial sessions.
<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. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</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. Homework assignment	15%	√	√	√	√
2. Test	35%	√	√		√
3. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial/Case study/Laboratory	9 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Nevers N. D., *Air Pollution Control Engineering*, McGraw-Hill, latest edition.
2. Heinsohn R. J. and Kabel R. L., *Sources and Control of Air Pollution*, Prentice Hall, latest edition.
3. Toole-O'Neil B., *Dry Scrubbing Technology for Flue Gas Desulfurization*, Kluwer Academic Publisher, latest edition.
4. Lewandowski, D. A., *Design of Thermal Oxidation Systems for Volatile Organic Compounds*, Lewis Publishers, latest edition.
5. Dickenson, T. C., *Filters and Filtration Handbook*, 4th edition, Elsevier Advanced Technology, latest edition.
6. Crittenden B. and Thomas, W. J., *Adsorption Technology and Design*, Butterworth Heinemann, latest edition.

Journals

- Environmental Science and Technology
- Separation and Purification Technology
- Aerosol Science and Technology
- Journal of Aerosol Science
- Process Safety and Environmental Protection
- AICHE Journal

Annex

Operational Guidelines on Dissertation

1. INTRODUCTION

The dissertation is a very significant component of a Master's 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 *pages 19 to 21*).

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 Department may arrange an Introduction Talk before the commencement of an academic year. Students will be encouraged to approach the faculty members and discuss research topics of mutual interest. ***Only*** students who have registered on the dissertation subject will be assigned supervisors and permitted to submit proposals.

2.1.2 Student will prepare a dissertation proposal in a standard format using a synopsis form (Form PSE125 attached) in consultation with his academic supervisor.

2.1.3 Students are expected to submit their dissertation proposal to the DPPC for approval no later than the last teaching day of the semester in which the student first registers for the dissertation.

2.1.4 Regulations Concerning Dissertation Registration

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

2.1.4.2 Students should understand that approval to commence a dissertation is not guaranteed. Some students may not be granted permission to proceed with a dissertation, and as a result, they will be asked to exit the Programme upon fulfilling the requirements for the Master's Degree in the non-dissertation track or receive a Postgraduate Diploma award.

2.1.4.3 Students can register for ME591 Dissertation ***only*** if they have taken a total of 3 taught subjects (including credit transferred subjects), i.e., probably in Semester 2. 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 they register for the subject. Fees paid will not be refunded even if the student withdraws from his dissertation or the programme during the course of his registration. The registration period for the dissertation is set at a maximum of 4 semesters from the date of the subject 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.

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

2.1.4.5 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 PSE126 attached) to the Departmental Postgraduate Programme Committee (DPPC) via their academic supervisor at least once every semester to ensure the 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 (DPPC), a student who fails to progress to his academic supervisor's satisfaction will receive a warning letter from the department hosting the award.

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 PSE127 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 assessors 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 industry, to be appointed by the Departmental Postgraduate Programme Committee.

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 the 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. Individual awards may modify key items and the recommended weightings according to the needs of each award.

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 forwarded to the DPPC.

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 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 DPPC is TWO WEEKS before the meeting of the Subject Assessment Review Panel.

2.5.3.5 The Department could at her 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 may apply on the advice of the supervisor. The application must be approved by the DPPC.

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 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 with 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 agreed programme. The responsibility for arranging meetings between the 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 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 publishedor written, nor material that has been accepted for the award of any otherdegree 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.

5. BINDING OF DISSERTATIONS

[This is optional. Students may consult their supervisor on the requirement.]

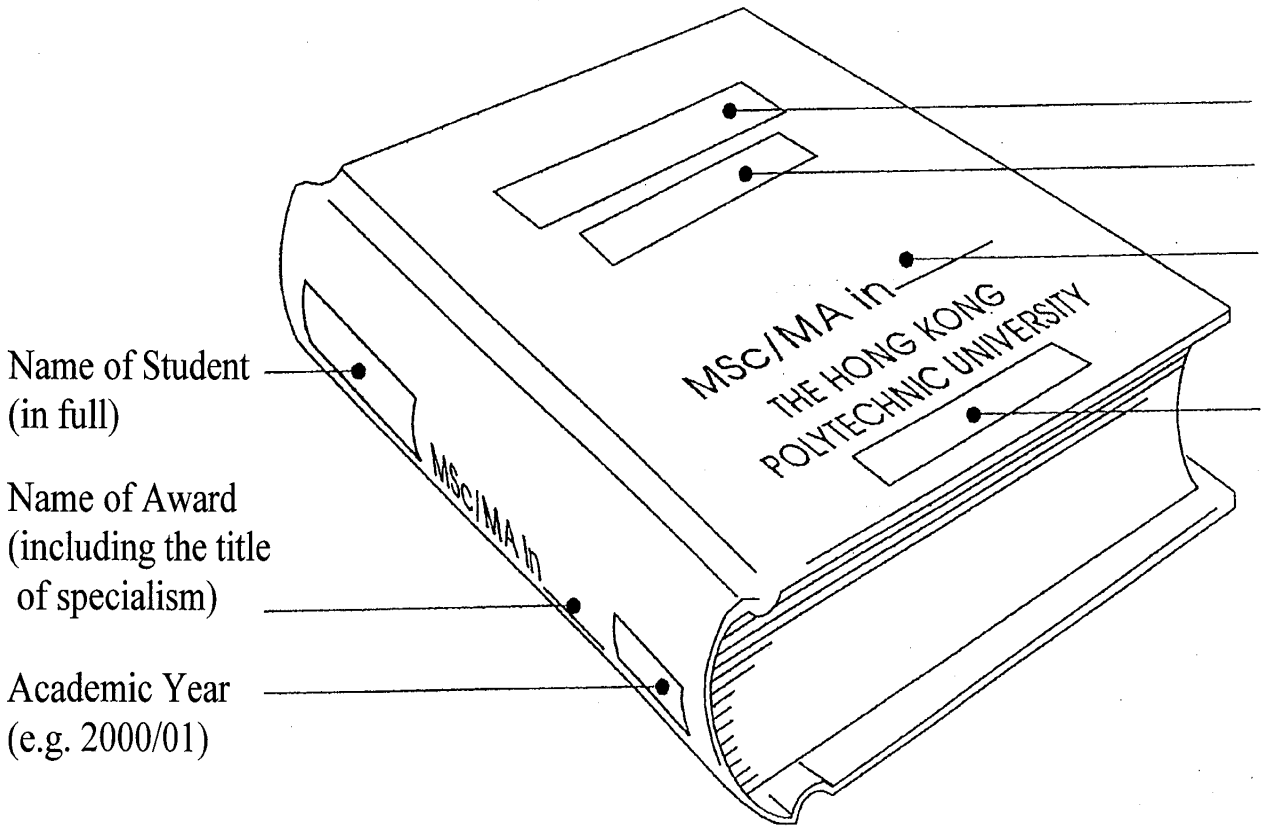
5.1 After assessment students will have their dissertations bound by outside binderies at their own expense. A rough sketch of a bound dissertation is set out on next page.

5.2 All dissertations should be bound with hard covers, with silver blocking on the front cover and on the spine. The colour should be navy blue.

5.2.1 Of the final copies submitted, one of these may be in a temporary heat-sealed "Perfect" binding with the title, name of author, degree and date. One of the final copies will be bound and will be lodged with the host department.

5.2.2 These final copies of the dissertation shall be checked and approved by the academic supervisor or Dissertation Coordinator. This shall be done within one month of the dissertation oral examination.

Rough Sketch of a Bound Dissertation



THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Master of Science in Mechanical 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 (DPPC) 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 DPPC for approval no later than the last day of a 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 (DPPC)

Approved/Referred back for improvement/Rejected

Signature: _____ Date: _____
Chairman, Departmental Postgraduate Programme Committee (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

Master of Science in Mechanical 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 (DPPC) 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 the 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* (*delete as appropriate*)

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

Master of Science in Mechanical 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 (DPPC)

The Departmental Postgraduate Programme Committee (DPPC) has nominated

_____

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

Signature: Date:

About Plagiarism

Students should refer to Appendix 3 of the Student Handbook for details:
https://www.polyu.edu.hk/ar/students-in-taught-programmes/student-handbook/

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 Department and your teacher

- Different disciplines or professions may have slightly different conventions for citation and referencing. Ask your Department or 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 is 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 "About Plagiarism and How to Avoid It" developed by the University at https://www.polyu.edu.hk/ogur/docdrive/Academic_Integrity/Plagiarism_Booklet.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 responsibility 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, honest, 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.

4. 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.

5. 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.

6. 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.