THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of
Aeronautical and Aviation Engineering
航空及民航工程學系

Department of
Aeronautical and Aviation Engineering

Bachelor of Engineering (Hons) Scheme in Aviation Engineering

Programme Code: 48403
Full-time Credit-based

Programme Requirement Document 2025 cohort

September 2025

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

PART A PROGRAMME SCHEME

1. General Information

1.1 Introduction

Programme Title and Programme Code	Bachelor of Engineering (Hons) Scheme in Aviation Engineering (BEng Scheme in AE) 航空工程學(榮譽)工學士學位組合課程 Scheme code: 48403 JUPAS code: JS3140
Host Department	Department of Aeronautical and Aviation Engineering (AAE)
Programme Structure	Credit-based
Mode of Attendance	Full-time
Normal Duration of Study	4 years (2 years for Senior Year intake)
Awards Title	There are two awards operation under the BEng Scheme in AE: • Bachelor of Engineering (Honours) in Aviation Engineering 航空工程學(榮譽)工學士學位 • Bachelor of Engineering (Honours) in Air Transport Engineering 民航工程學(榮譽)工學士學位
Credit Required for Graduation	(a) Academic Credits: **120** *(Exact number of credits depends on the academic background of students)* (b) Training Credits: **10**
Implementation Year	The first intake started in September 2022

1.2 Characteristics

The scheme has the following characteristics:

(a) A four-year degree programme in Hong Kong SAR to train students to become engineers in the aviation industry.
(b) Some subjects are co-taught by PolyU academics and industry professionals to give students first-hand information on the aviation industry.
(c) Summer internships, technical visits and on-site experience sharing may be arranged to enhance students' learning and work experience in the industry.

In this scheme, students receive a broad-based knowledge of science and engineering in the first year and acquire basic knowledge in aircraft and aviation systems in the upper years. In the second year, students will opt their preferred programme to:

1) Bachelor of Engineering (Honours) in Aviation Engineering (BEngAE), which embarks on more advanced aviation engineering subjects such as aerodynamics, aircraft design, safety, control, and propulsion systems; OR
2) Bachelor of Engineering (Honours) in Air Transport Engineering (BEngATE), which embarks on more advanced air transport engineering subjects such as airline operation, human factors in aviation, air traffic management and airport operation.

Depending on the programme choice, the award programme will prepare them to lay a strong foundation to learn aeronautical or air transport engineering-related subjects and have hands-on experience in aircraft component manufacturing processes. In the last two years (i.e. the third and fourth year of the normal study pattern), they have the opportunity to focus study on a chosen stream to acquire specialised knowledge in a specific area of aviation engineering. Students can also freely choose the four elective subjects from the different streams to broaden their knowledge on aviation engineering. Possible study streams include (a) Aviation Services Engineering, (b) Aeronautical Engineering, and (c) Aircraft Maintenance Engineering.

Industrial Centre (IC) training which aims at providing students with basic hands-on engineering skills and practice for modern aircraft design through workshop and project training. Students may join an internship programme during the summer to gain a real-life working experience and to enhance their competitiveness in the future. Industrial-based final year projects may be provided to students to enhance their skills and knowledge to solve real-life problems.

1.3 Minimum Entrance Requirements

(a) For entry with HKDSE qualifications

The general minimum entrance requirements are as follows:

HKDSE Subjects	Core Subjects				Elective Subjects (including M1/M2)	
	Chinese Language	English Language	Mathematics	Citizenship and Social Development	1st Elective	2nd Elective
Level Requirement	3	3	2	Attained	3	3

There is no compulsory subject requirement. Preferred elective subjects for the programme include:

- Information and Communication Technology;
- Physics, Chemistry and combined science subjects with Physics; and
- Extended modules of Mathematics.

(b) For those who are applying on the basis of A-Level qualifications

- B in 3 A-Level subjects;
  AND
- Satisfy the English Language Requirement.

(c) For those who are applying on the basis of IB

- A minimum score of 32;
  AND
- Satisfy the English Language Requirement.

(d) For those who are applying on the basis of other qualifications

- An appropriate Diploma passed with credit or an appropriate Higher Certificate from a recognised institution;
  OR
- An appropriate Associate Degree / Higher Diploma from a recognised institution.

(e) Qualifications equivalent to (a), (b), (c), or (d).

Note 1: Credit transfer may be granted to applicants with A-Level / IB qualification / Higher Diploma / Associate Degree, or the equivalent.

Note 2: Holder of appropriate Higher Diploma or Associate Degree with good academic result at graduation (determined by PolyU AAE) may be considered for the Senior Year curriculum.

2. Rationale, Aims and Objectives

2.1 Rationale

The global aviation industry is growing at a rapid pace. Asia, especially China, is the key contributor and stakeholder in this growth. The worldwide demand for qualified engineers for this industry is enormous and imminent. Different forecast reports worldwide have expressed the concern for the serious shortage of licensed engineers that will affect the growth of this industry. The serious shortage of qualified engineers for the aviation industry has become a bottleneck for the sustainable growth of the aviation industry, which is a critical industry for Hong Kong. Unfortunately, there is yet a comprehensive academic programme in the field of aviation engineering offered by any university in Hong Kong that covers both hard- and soft-core knowledge of the aviation discipline. The 4-year scheme by PolyU is definitely a timely move to address the needs of the industry. The scheme comprises two undergraduate programmes: 1) Bachelor of Engineering (Honours) in Aviation Engineering (BEngAE) and 2) Bachelor of Engineering (Honours) in Air Transport Engineering (BEngATE). Both programmes aim at training students to become engineers with a broad understanding of both the engineering and operation in the aviation industry, while the BEngAE focuses on aircraft systems and design and BEngATE focuses on air transport systems and aviation operations. Graduates of the programmes can find employment as professional engineers in maintenance, repair, and operations organisations, and in the areas of air transportation, logistics, airline and airport operations, and aircraft component design and manufacturing.

2.2 Aim of BEng (Hons) Scheme in Aviation Engineering

In order to make our two undergraduate programmes (BEngAE and BEngATE) more attractive to the students, the AAE Department merged them together into the BEng (Hons) Scheme in Aviation Engineering. Students admitted into the BEng (Hons) Scheme in Aviation Engineering will study together during the first year and then complete their preferred programme (BEngAE or BEngATE) in the next three years until graduation. After successful completion of their chosen programme, students will be awarded with either Bachelor of Engineering (Honours) in Aviation Engineering or Bachelor of Engineering (Honours) in Air Transport Engineering. The structure of the BEng (Hons) Scheme in Aviation Engineering is illustrated in Figure 2.1.

2.3 Programme Objectives in BEngAE

This programme aims to equip highly skilled graduates with:

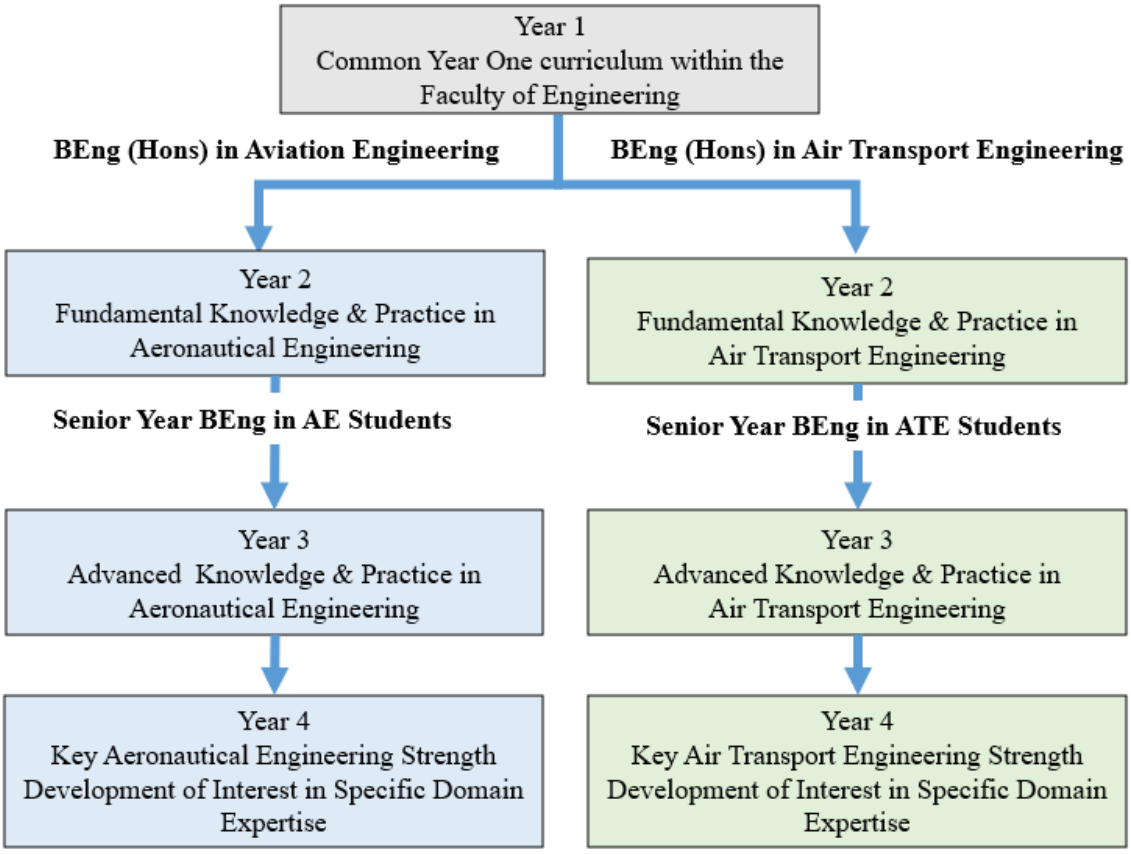
1. In-depth understanding of the aviation and aeronautical engineering systems and up-to-date technologies, as well as specialised knowledge in a chosen stream of study.
2. Competence to handle different engineering problems academically and practically in the aviation and aeronautical industry.
3. Sufficient knowledge to manage and solve problems through effective and efficient project management and planning.
4. Effective in communication with different stakeholders by the use of state-of-the art technologies and aviation and aeronautical languages.

2.4 Programme Objectives in BEngATE

This programme aims to equip highly skilled graduates with:

1. In-depth understanding of the air transport operations, resource planning, human-centred design of aviation systems and airworthiness and up-to-date technologies, as well as specialised knowledge in a chosen stream of study.
2. Competence to handle different engineering problems practically and academically in the aviation industry.
3. Sufficient knowledge and skills to manage different projects related to the aviation sector effectively and efficiently.
4. Confidence in communicating with different parties and stakeholders by the use of state-of-the-art technologies and aviation languages.

Figure 2.1 - Structure of BEng (Hons) Scheme in Aviation Engineering



*Senior Year Students are admitted directly into either BEngAE or BEngATE.

3. Intended Learning Outcomes (ILOs)

The BEng (Hons) in Aviation Engineering (BEngAE) and BEng (Hons) in Air Transport Engineering (BEngATE) programmes offered by the AAE Department are designed to produce graduates that are broad-based and knowledgeable in aviation engineering and air transport engineering respectively. It is expected that our graduates would accept responsibilities as professionals in academic, industrial and governmental organisations.

3.1 Institutional Learning Outcomes

The institutional learning outcomes are:

1. **Socially responsible leaders with a strong sense of national pride and a global outlook:** Care about and understand local, national and global issues, and be able to think globally, act responsibly, and lead with integrity and pride for the benefit of society and a sustainable future.
2. **Future-ready professionals who possess technical acumen:** Be able to integrate and apply in-depth discipline knowledge and specialised skills, leverage changing and emerging technologies for work, function in variable interdisciplinary contexts, and demonstrate professionalism and entrepreneurial spirit at work.
3. **Critical thinkers and creative problem solvers:** Be able to critically evaluate information and arguments, draw logical and informed conclusions, identify problems and formulate innovative solutions, in both professional and everyday contexts.
4. **Effective communicators and collaborators:** Be able to communicate effectively in English and Chinese in professional and everyday contexts* (* *The expectation to communicate in Chinese does not apply to foreign students.*), collaborate with people from diverse backgrounds and different perspectives, and contribute to effective teamwork and positive group dynamics.
5. **Adaptable and resilient lifelong learners:** Committed to continual learning and self-improvement, engage in learning with a sense of purpose, manage their own learning, adapt to different learning situations, and deal effectively with the arising stress and challenges.

3.2 Desired Learning Outcomes of The Hong Kong Institution of Engineers (HKIE)

To align with the professional accreditation from The Hong Kong Institution of Engineers (HKIE), the desired learning outcomes achieved by graduates of accredited engineering programmes proposed by HKIE are used for the Department to develop the learning outcomes of our academic programmes as below:

(a) an ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline;

(b) an ability to design and conduct experiments, as well as to analyse and interpret data;

(c) an ability to design a system, component or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability;

(d) an ability to function on multi-disciplinary teams;

(e) an ability to identify, formulate and solve engineering problems;

(f) an ability to understand professional and ethical responsibility;

(g) an ability to communicate effectively;

(h) an ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public;

(i) an ability to stay abreast of contemporary issues;

(j) an ability to recognise the need for, and to engage in life-long learning;

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline; and

(l) an ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations.

3.3 Intended Learning Outcomes of BEngAE

The programme aims to achieve 11 learning outcomes. On successful completion of the BEng (Hons) in Aviation Engineering programme, students are expected to achieve the following abilities, which are classified into two groups.

Professional/academic knowledge and skills (PAK):

(a) To identify, formulate and solve problems in aviation and aeronautical engineering by applying knowledge of mathematics, science and engineering.

(b) To design and conduct experiments, as well as to analyse and interpret data.

(c) To design systems, components or processes to meet desired needs.

(d) To use the techniques, skills, emerging technologies, and modern engineering tools, including the computational tools necessary for engineering practice.

(e) To work professionally in general aviation and aeronautical systems, including the design and realisation of such systems.

(f) To understand the function and manufacturing of aviation and aircraft components, considering sustainability in these processes.

Professional outlook and workplace skills (POW):

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

(b) To lead and function professionally in multidisciplinary teams.

(c) To understand professional, ethical and social responsibility.

(d) To communicate effectively and professionally with appropriate languages and tools.

(e) To actively engage in and advocate for life-long learning, demonstrating adaptability and resilience in pursuit of personal and professional growth

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

BEngAE Programme Outcomes	BEngAE Programme Objectives			
	1	2	3	4
PAK(a)	√	√	√	
PAK(b)	√	√	√	

BEngAE Programme Outcomes	BEngAE Programme Objectives			
	1	2	3	4
PAK(c)		√		
PAK(d)	√	√	√	
PAK(e)	√	√		
PAK(f)	√	√	√	
POW(a)	√	√	√	
POW(b)			√	√
POW(c)	√	√	√	√
POW(d)			√	√
POW(e)	√	√	√	√

3.3.1 **Relationship of BEngAE Programme Objectives to University Mission**

The University has the following mission:

(a) To nurture socially responsible professionals and leaders with a strong sense of national pride and a global perspective.
(b) To pursue world-leading research and innovation for societal benefits.
(c) To foster a University community in which all members are united with a strong sense of belonging and pride, empowering the University to scale new heights.

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

BEngAE Programme Objectives	University Mission		
	(a)	(b)	(c)
1	√	√	√
2	√	√	√
3	√	√	√
4		√	√

3.3.2 **Relationship of Intended Learning Outcomes of BEngAE to Institutional Learning Outcomes**

Programme Outcomes	Institutional Learning Outcomes of PolyU				
	1	2	3	4	5
PAK(a)		√	√		√
PAK(b)	√	√	√		√
PAK(c)	√	√	√		√
PAK(d)	√		√	√	√
PAK(e)	√		√	√	
PAK(f)	√	√	√		√
POW(a)	√	√	√		
POW(b)	√		√	√	√
POW(c)	√		√	√	√
POW(d)	√		√	√	√
POW(e)					√

3.3.3 **Relationship of BEngAE Intended Learning Outcomes to the Desired Learning Outcomes of the Hong Kong Institution of Engineers (HKIE)**

Learning Outcomes	Desired Learning Outcomes Proposed by HKIE for Engineering Degrees	ILOs of the Current Programme
a	An ability to apply knowledge of mathematics, science and engineering appropriate to the degree discipline	PAK(a)
b	An ability to design and conduct experiments, as well as to analyse and interpret data	PAK(b)
c	An ability to design a system, components or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability	PAK(c), PAK(f)
d	An ability to function on multi-disciplinary teams	POW(b)
e	An ability to identify, formulate and solve engineering problems	PAK(a)
f	An ability to understand professional and ethical responsibility	POW(c)
g	An ability to communicate effectively	POW(d)
h	Ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public	POW(a)
i	An ability to stay abreast of contemporary issues	POW(a)
j	An ability to recognise the need for, and to engage in life-long learning	POW(e)
k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice appropriate to the degree discipline	PAK(d), PAK(e)
l	An ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations	PAK(d), POW(d)

3.4 Intended Learning Outcomes of BEngATE

On successful completion of the BEng (Hons) in Air Transport Engineering programme, students will be able to:

Professional/academic knowledge and skills (PAK):

(a) To identify, formulate and solve problems in the discipline of air transport, air logistics, resource planning, and human factors engineering by applying knowledge of mathematics, science and engineering.

(b) To design and conduct experiments, as well as to analyse and interpret data.

(c) To design a system, component or process to meet desired needs.

(d) To use the techniques, skills, emerging technologies, and modern engineering tools, including computational tools necessary for engineering practice.

(e) To work professionally in general aircraft, airport and aviation systems, including the design and realisation of such systems.

(f) To understand manufacturing methods for components of aircraft and aviation systems, considering sustainability in these processes.

Professional outlook and workplace skills (POW):

(a) To have sufficient knowledge on contemporary issues and the broad education necessary to understand the impact of engineering solutions in a global and societal context.

(b) To lead and function professionally in multidisciplinary teams.

(c) To understand professional, ethical and social responsibility.

(d) To communicate effectively and professionally with different parties and stakeholders using appropriate industrial languages and tools.

(e) To actively engage in and advocate for life-long learning, demonstrating adaptability and resilience in pursuit of personal and professional growth.

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

BEngATE Programme Outcomes	BEngATE Programme Objectives			
	1	2	3	4
PAK(a)	√	√	√	
PAK(b)	√	√	√	
PAK(c)	√	√	√	
PAK(d)		√	√	√
PAK(e)		√	√	√
PAK(f)	√	√	√	√
POW(a)	√	√	√	√
POW(b)		√	√	√
POW(c)			√	√
POW(d)		√	√	√
POW(e)	√	√	√	√

3.4.1 Relationship of BEngATE Programme Objectives to University Mission

The University has the following mission:

(a) To nurture socially responsible professionals and leaders with a strong sense of national pride and a global perspective.
(b) To pursue world-leading research and innovation for societal benefits.
(c) To foster a University community in which all members are united with a strong sense of belonging and pride, empowering the University to scale new heights.

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

BEng ATE Programme Objectives	University Mission		
	(a)	(b)	(c)
1	√	√	√
2	√	√	√
3		√	√
4		√	√

3.4.2 Relationship of Intended Learning Outcomes of BEngATE Programme to Institutional Learning Outcomes

BEngATE Programme Outcomes	Institutional Learning Outcomes of PolyU				
	1	2	3	4	5
PAK(a)		√	√		√
PAK(b)	√	√	√		√
PAK(c)	√	√	√		√
PAK(d)	√		√	√	√
PAK(e)	√		√	√	
PAK(f)	√	√	√		√
POW(a)	√	√	√		
POW(b)	√		√	√	√
POW(c)	√		√	√	√
POW(d)	√		√	√	√
POW(e)					√

3.4.3 Relationship of BEngATE Intended Learning Outcomes of the Programme to the Desired Learning Outcomes of The Hong Kong Institution of Engineers (HKIE)

Learning Outcomes	Definition of Desired Learning Outcomes Proposed by HKIE	ILOs of the Current Programme
a	An ability to apply knowledge of mathematics, science and engineering appropriate to the degree discipline	PAK(a)

Learning Outcomes	Definition of Desired Learning Outcomes Proposed by HKIE	ILOs of the Current Programme
b	An ability to design and conduct experiments, as well as to analyse and interpret data	PAK(b)
c	An ability to design a system, components or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability	PAK(c), PAK(f), POW(c)
d	An ability to function on multi-disciplinary teams	POW(b)
e	An ability to identify, formulate and solve engineering problems	PAK(a)
f	An ability to understand professional and ethical responsibility	POW(c)
g	An ability to communicate effectively	POW(d)
h	An ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public	PAK(e), POW(a)
i	An ability to stay abreast of contemporary issues	POW(a)
j	An ability to recognise the need for, and to engage in life-long learning	POW(e)
k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice appropriate to the degree discipline.	PAK(d), PAK(e)
l	An ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations	PAK(d), POW(d)

3.5 General Approach to Teaching, Learning and Assessment

To accomplish the intended learning outcomes of the programme, students are expected to achieve specific learning outcomes for each subject outlined in Part B. These learning outcomes are spelt out explicitly in the syllabus of each subject. They provide a motivation and a target for students to formulate their study plan before the course. The students may also use the information to conduct self-assessment after the course.

In general, a one-credit subject is allocated with a contact time of one hour per week. Hence, a typical PolyU subject offered by the Department normally requires 3 hours per week of class attendance. There are 13 weeks in each semester leading to a total of 39 hours of contact time for a three-credit subject. The structuring of those 39 contact hours varies from subject to subject, and the details are given in the syllabi.

The Department uses a wide variety of teaching methods, in a number of different settings including formal lectures, invited lectures by guest speakers, seminars, laboratory work, practical work, project work, case studies and student project presentations. In most of the classroom activities, the staff member will begin with a formal lecture that is designed to give students an overview of the topic on hand, which may also require their engagement through questioning or interactive hand-outs. Some of these hand-outs form a part of the assignments

where the students are required to work after the class. The students are frequently required to contribute through presentations, through working on case studies and projects, through experimental studies by laboratory classes. In many of these teaching/learning activities, students are asked to participate in small groups. These different teaching and learning approaches will be assessed with appropriate methods. In case of group activity, both the overall performance of the group as well as the individual effort/contribution of each team member will be assessed.

The prime purpose of assessment is to enable students to demonstrate that they have met the aims and objectives of the academic programmes: in particular, they have fulfilled the requirement of each subject and have, at the end of their study, achieved the standard appropriate to the award.

Assessment also fulfils two major functions. It is used to evaluate whether the specific student learning-outcomes of a subject have been achieved by the students, and distinguish their performance by intended learning outcomes. Assessment will also serve as prompt and useful feedback to students. Students will be informed of their performance in the assessment so that they are aware of their progress and attainment to facilitate teaching and learning. Students' performance in a subject will be evaluated by continuous assessment, or final examination and continuous assessment as deemed appropriate. Where both methods are used, the weighting of each in the overall subject grade will be clearly stated in the relevant subject syllabi. Continuous assessment may include tests, assignments, project reports and oral presentations, laboratory work and other forms of classroom participation. As assessment should be a matter of judgment, the subject lecturer will have the discretion to assign a final grade which is considered to reflect more appropriately the overall performance of the student in a subject.

3.6 Alignment of Teaching, Learning and Assessment Methods with Programme Outcomes

There are compulsory and elective subjects offered in the programmes. The details for each individual subject are contained in the respective syllabus listed in Part B. These explain how the objectives, teaching/learning activities, and eventually student learning outcomes, can be matched together so that they are constructively aligned in the context of these subjects. Typical teaching methods include lectures, tutorials, laboratory work, case studies which are supplemented by projects, and presentations by individual students. The major forms of assessment used in the programme are written examinations (open or closed book) and continuous assessments. In assessing students' academic performance and attainment of intended learning outcomes, much emphasis is placed on their ability to analyse, synthesise, integrate and apply what they have learnt in the course of their studies. Details of the alignment of teaching, learning and assessment methods with programme outcomes are shown in Section 4.8 and the individual subject syllabus.

4. Programme Structure, Curriculum and Study Pattern

4.1 General Structure and Curriculum of BEngAE and BEngATE

The number of credits required for graduation is 120 academic credits and 10 training credits. Furthermore, the students are required to fulfill the Work-Integrated Education (WIE).

The 120 academic credits consist of 27 mandatory credits of General University Requirements (GUR), 87 credits of Major Requirements and 6 credits of Free Electives. The following table lists the subjects, their credit values, pre-requisite requirements (if any) and the category to which they belong (Compulsory or Elective). All subjects shown as compulsory are non-deferrable and must be taken in accordance to the progression pattern. The subjects offered will be updated from time to time according to the needs of society and the profession.

Details of GUR and Major of BEngAE and BEngATE are shown in the following tables:
Table 4.1.1: General University Requirements (GUR) for both BEngAE and BEngATE
Table 4.1.2: Major Requirements for BEngAE
Table 4.1.3: Major Requirements for BEngATE

Table 4.1.1: General University Requirements (GUR) for both BEngAE and BEngATE

Areas	**Credits**
▪ Artificial Intelligence and Data Analytics Requirement (AIDA)	2
▪ Innovation and Entrepreneurship Requirement (IE)	1
▪ Language & Communication Requirements (LCR)	9
o English	(6)
o Chinese	(3)
▪ Leadership Education and Development (LEAD)	3
▪ Service-Learning (SL)	3
▪ Cluster-Area Requirements (CAR)	9
3 credits from each of the following 3 cluster areas	
o Human Nature, Relations and Development (CAR A)	(3)
o Chinese History and Culture (CAR M)	(3)
o Cultures, Organisations, Societies and Globalisation (CAR N)	(3)
* Students must also fulfil the Reading and Writing Requirements in English and Chinese (CR/CW and ER/EW)	
▪ Healthy Lifestyle (non-credit bearing)	Nil
Total GUR credits	27

Table 4.1.2: Major Requirements for BEngAE

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Discipline-Specific Requirements (DSR)			
AAE1003	Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation	1	
AAE2003	Introduction to Aircraft Systems	3	
AAE2004	Introduction to Aviation System and Air Transport Regulation	3	
AAE2005	Electrics and Electronic for Aeronautical Engineering	3	
AAE3001	Fundamentals of Aerodynamics	3	AMA2111/AMA2112
AAE3002	Aircraft Structures and Materials	3	ENG2001 and ME23001
AAE3003	Aircraft Propulsion Systems	3	
AAE3004	Dynamical Systems and Control	3	AMA2111/AMA2112
AAE3008	Fundamental Thermal-fluid Science	3	AP10005 and AMA2111
AAE4002	Capstone Project	6	Refer to SDF in Part B
AAE4004	Airworthiness and Regulations	3	
AAE4006	Flight Mechanics and Control Systems	3	AAE3004
AAE4301	Avionics Systems	3	
AF3625	Engineering Economics	3	
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics	3	
AMA1120	Basic Mathematics II – Calculus and Linear Algebra	3	AMA1110
AMA2111	Mathematics I	3	AMA1120
AMA2112	Mathematics II	3	AMA2111
AP10005	Physics I (i)	3	
AP10006	Physics II (i)	3	
ELC3531	Professional Communication in English for Engineering Students	2	
ENG1004	Engineering Professionals in Society I	1	
ENGxxx	Engineering Professionals in Society II	2	
ENG2001	Fundamentals of Materials Science and Engineering	3	
ENG2002	Computer Programming	3	
ME23001	Engineering Mechanics	3	AP10005
	Elective Subject I / II / III / IV (iii)	12	
AAE2104/ IC2117	Applied Engineering Fundamentals	2 (TRN)	
AAE3106/ IC384	Fundamentals of Aircraft Engineering Practice	2 (TRN)	
AAE3107/ IC385	Appreciation of Aircraft Manufacturing Processes	2 (TRN)	
AAE3108/ IC386	Aircraft Manufacturing and Maintenance Practice	1 (TRN)	
AAE3105 / IC389	Aviation Engineering Integrated Project	3 (TRN)	
Total number of DSR credits		**87 + 10 Training Credits**	

(i) To strengthen the Physics knowledge of HKDSE students who do not have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics); non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities; and other students who do not possess the equivalent qualifications, these students are advised to complete "AP10001 Introduction to Physics".

(ii) Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the CAR - Chinese Reading and Writing requirements.

(iii) Elective Subjects

Students are required to study four elective subjects. They may choose any four subjects from Table 4.1.4. These elective subjects are classified into the following three specific areas:

(a) Aviation Services Engineering
(b) Aeronautical Engineering
(c) Aircraft Maintenance Engineering

Table 4.1.3: Major Requirements for BEngATE

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Discipline-Specific Requirements (DSR)			
AAE1003	Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation	1	
AAE2003	Introduction to Aircraft Systems	3	
AAE2004	Introduction to Aviation System and Air Transport Regulation	3	
AAE2005	Electrics and Electronic for Aeronautical Engineering	3	
AAE3006	Safety, Reliability and Compliance	3	
AAE3009	Operations Research and Computational Analytics in Air Transport Operations	3	AAE2004
AAE3010	Airline Operations	3	AAE2004
AAE3011	Aircraft Performance and Flight Management	3	AMA2112
AAE3012	Air Traffic Management and Airport Operations	3	AAE2004
AAE4004	Airworthiness and Regulations	3	
AAE4012	Capstone Project	6	Refer to SDF in Part B
AAE4014	Aviation Project Management	3	
AAE4301	Avionics Systems	3	
AAE4903	Human Factors in Aviation	3	
AF3625	Engineering Economics	3	
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics	3	
AMA1120	Basic Mathematics II – Calculus and Linear Algebra	3	AMA1110
AMA2111	Mathematics I	3	AMA1120
AMA2112	Mathematics II	3	AMA2111
AP10005	Physics I [(i)]	3	
AP10006	Physics II [(i)]	3	
ELC3531	Professional Communication in English for Engineering Students	2	
ENG1004	Engineering Professionals in Society I	1	
ENGxxx	Engineering Professionals in Society II	2	
ENG2001	Fundamentals of Materials Science and Engineering	3	
ENG2002	Computer Programming	3	
	Elective Subject I / II / III / IV [(iii)]	12	
AAE2104/ IC2117	Applied Engineering Fundamentals	2 (TRN)	
AAE3106/ IC384	Fundamentals of Aircraft Engineering Practice	2 (TRN)	
AAE3107/ IC385	Appreciation of Aircraft Manufacturing Processes	2 (TRN)	
AAE3108/ IC386	Aircraft Manufacturing and Maintenance Practice	1 (TRN)	
AAE3105 / IC389	Aviation Engineering Integrated Project	3 (TRN)	
Total number of DSR credits		**87 + 10 Training Credits**	

(i) To strengthen the Physics knowledge of HKDSE students who do not have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics); non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities; and other students who do not possess the equivalent qualifications, these students are advised to complete "AP10001 Introduction to Physics".

(ii) Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the CAR - Chinese Reading and Writing requirements.

(iii) Elective Subjects

Students are required to study four elective subjects. They may choose any four subjects from Table 4.1.4. These elective subjects are classified into the following three specific areas:

(a) Aviation Services Engineering
(b) Aeronautical Engineering
(c) Aircraft Maintenance Engineering

Table 4.1.4: Elective Subjects for BEngAE and BEngATE^

Students are required to select four subjects from a pool of electives as shown in the table below. Through the choice of electives, students will acquire specialised knowledge in a specific area of aviation engineering.

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Aviation Services Engineering			
AAE3012#	Air Traffic Management and Airport Operations	3	AAE2004
AAE4009	Data Science and Data-driven Optimisation in Airline and Airport Operations	3	AAE3009
AAE4013	Aviation Logistics and Supply Chain Informatics	3	AAE2004
AAE4015	Advanced Accident and Hazards Analysis with Big Data in Aviation	3	AAE4903
AAE4304	Advanced Positioning and Navigation Systems	3	
AAE4902	Pilot Ground Theory	3	
AAE4903#	Human Factors in Aviation	3	
AAE4904	Meteorology in Aviation	3	
Aeronautical Engineering			
AAE4011	Artificial Intelligence in Unmanned Autonomous Systems	3	AAE2003
AAE4105	Engineering Composites	3	AAE3002
AAE4111	Compressible Aerodynamics	3	AAE3008
AAE4112	Satellite System Engineering and Design	3	AAE3004 and AMA2112
AAE4113	Aerospace Propulsion	3	AAE3003
AAE4202	Electronics & Information Technologies for Unmanned Aerial Systems	3	
AAE4203	Guidance and Navigation	3	AAE2003
Aircraft Maintenance Engineering			
AAE4107	Aircraft Gas Turbine Engine Systems	3	
AAE4108	Aircraft Inspection and Testing	3	
AAE4109	Aircraft Maintenance Practices	3	
AAE4110	Aircraft Propeller	3	

^The elective subjects are updated from time to time to cope with the needs of the industry. Not all subjects will be offered in each semester. Since there is a minimum planned class size for each subject, the subject hosting departments have the discretion to cease the offering of subjects which fail to enroll students up to the minimum class size.

AAE3012 'Air Traffic Management and Airport Operations' and AAE4903 'Human Factors in Aviation' are compulsory subjects of BEngATE.

Students may take Level 5 subjects as electives during their study. Credit transfer from undergraduate studies to postgraduate studies will be allowed only on the condition that these credits were on top of the Bachelor's degree requirements.

4.2 Normal Progression Pattern of BEngAE and BEngATE

This section outlines the normal 4-Year study pattern for BEngAE and BEngATE. They are only indicative and by no means mandatory; students may take slightly different plans provided that the credit requirements of the intended award are fulfilled within the normal duration of the programme. Each subject carries 3 credits, unless specified otherwise.

Table 4.2.1: BEngAE Normal Progression Pattern for student with Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent

Table 4.2.2: BEngAE Normal Progression Pattern for student without Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent

Table 4.2.3: BEngATE Normal Progression Pattern for student with Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent

Table 4.2.4: BEngATE Normal Progression Pattern for student without Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent

Recommended CARs subject/s:

Cultures, Organisations, Societies and Globalisation (CAR N):
AAE1BN01 Introduction to Aviation Industry
AAE1BN01V Introduction to Aviation Industry

Table 4.2.1: BEngAE Normal Progression Pattern for student with Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent (Total credit requirement for graduation: 120 academic credits + 10 training credits)

Year 1 (31 + 2 training credits)	
Semester 1 (15 + 1 training credits)	**Semester 2 (16 + 1 training credits)**
AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering (GUR-AIDA) (*2 credits*)	AAE1002 Innovation and Entrepreneurship in Green Aviation and Space Economy (GUR-IE) (*1 credit*)
AMA1110 Basic Mathematics I	APSS1L01 Tomorrow's Leaders
ENG1004 Engineering Professional in Society I (1 credits)	ENG2002 Computer Programming
CAR I ^	AMA1120 Basic Mathematics II (Faculty Elective II)
AP10005 Physics I (Faculty Elective I)	Free elective (1)
LCR I	LCR II
Healthy Lifestyle (non-credit bearing) ^	
AAE2103/IC2117 – Applied Engineering Fundamentals (2 training credits)	
Year 2 (36 + 4 training credits)	
Semester 1 (19 + 2 training credits)	**Semester 2 (17 + 2 training credits)**
AAE1003* Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation (1 credit)	AAE2005 Electrics and Electronic for Aeronautical Engineering
AAE2003 Introduction to Aircraft Systems	AMA2112 Mathematics II
AAE2004 Introduction to Aviation System and Air Transport Regulation	ENGXXX* Engineering Professional in Society II (2 credits)
AMA2111 Mathematics I	ME23001 Engineering Mechanics
AP10006 Physics II	LCR III Chinese Language Subject
ENG2001 Fundamentals of Materials Science and Engineering	Service Learning ^
CAR II^	AAE3107 / IC385* Fundamentals of Aircraft Fabrication Techniques (2 training credits)
AAE3106 / IC384* Fundamentals of Aircraft Engineering Practice (2 training credits)	
Year 3 (21 + 4 training credits)	
Semester 1 (9 + 2.5 training credits)	**Semester 2 (12 + 1.5 training credits)**
AAE3002 Aircraft Structures and Materials	AAE3001 Fundamentals of Aerodynamics
AAE3004 Dynamical Systems and Control	AAE3003 Aircraft Propulsion Systems
AAE3008 Fundamental Thermal-fluid Science	AAE4006 Flight Mechanics and Control Systems
AAE3108 / IC386* Aircraft Inspection Practice (1 training credit)	AF3625 Engineering Economics
AAE3105 / IC389* Aviation Engineering Integrated Project (3 training credits)	
Year 4 (32 credits)	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE4301 Avionics Systems
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (3)
CAR III ^	Elective Subject (4)
Elective Subject (1)	Free elective (2)
Elective Subject (2)	
AAE4002 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

*** ***New subjects are subject to approval.***

Table 4.2.2: BEngAE Normal Progression Pattern for student without Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent (Total credit requirement for graduation: 120 academic credits + 10 training credits)

Year 1 (31 + 2 training credits)	
Semester 1 (18 + 1 training credits)	**Semester 2 (13 + 1 training credits)**
AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering (GUR-AIDA) (*2 credits*)	AAE1002 Innovation and Entrepreneurship in Green Aviation and Space Economy (GUR-IE) (*1 credit*)
AMA1110 Basic Mathematics I	APSS1L01 Tomorrow's Leaders
ENG1004 Engineering Professional in Society I (1 credits)	ENG2002 Computer Programming
CAR I ^	AMA1120 Basic Mathematics II (Faculty Elective II)
AP10001 Introduction to Physics (Free elective (1))	LCR II
AP10005 Physics I (Faculty Elective I)	
LCR I	
Healthy Lifestyle (non-credit bearing) ^	
AAE2103/IC2117 – Applied Engineering Fundamentals (2 training credits)	
Year 2 (36 + 4 training credits)	
Semester 1 (19 + 2 training credits)	**Semester 2 (17 + 2 training credits)**
AAE1003* Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation (1 credit)	AAE2005 Electrics and Electronic for Aeronautical Engineering
AAE2003 Introduction to Aircraft Systems	AMA2112 Mathematics II
AAE2004 Introduction to Aviation System and Air Transport Regulation	ENGXXX* Engineering Professional in Society II (2 credits)
AMA2111 Mathematics I	ME23001 Engineering Mechanics
AP10006 Physics II	LCR III Chinese Language Subject
ENG2001 Fundamentals of Materials Science and Engineering	Service Learning ^
CAR II^	AAE3107 / IC385* Fundamentals of Aircraft Fabrication Techniques (2 training credits)
AAE3106 / IC384* Fundamentals of Aircraft Engineering Practice (2 training credits)	
Year 3 (21 + 4 training credits)	
Semester 1 (9 + 2.5 training credits)	**Semester 2 (12 + 1.5 training credits)**
AAE3002 Aircraft Structures and Materials	AAE3001 Fundamentals of Aerodynamics
AAE3004 Dynamical Systems and Control	AAE3003 Aircraft Propulsion Systems
AAE3008 Fundamental Thermal-fluid Science	AAE4006 Flight Mechanics and Control Systems
AAE3108 / IC386* Aircraft Inspection Practice (1 training credit)	AF3625 Engineering Economics
AAE3105 / IC389* Aviation Engineering Integrated Project (3 training credits)	
Year 4 (32 credits)	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE4301 Avionics Systems
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (3)
CAR III ^	Elective Subject (4)
Elective Subject (1)	Free elective (2)
Elective Subject (2)	
AAE4002 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

*** *New subjects are subject to approval.***

Table 4.2.3: BEngATE Normal Progression Pattern for student with Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent (Total credit requirement for graduation: 120 academic credits + 10 training credits)

Year 1 (31 + 2 training credits)	
Semester 1 (15 + 1 training credits)	**Semester 2 (16 +1 training credits)**
AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering (GUR-AIDA) (*2 credits*)	AAE1002 Innovation and Entrepreneurship in Green Aviation and Space Economy (GUR-IE) (*1 credit*)
AMA1110 Basic Mathematics I	APSS1L01 Tomorrow's Leaders
ENG1004 Engineering Professional in Society I (1 credits)	ENG2002 Computer Programming
CAR I^	AMA1120 Basic Mathematics II (Faculty Elective II)
AP10005 Physics I (Faculty Elective I)	Free elective (1)
LCR I	LCR II
Healthy Lifestyle (non-credit bearing) ^	
AAE2103/IC2117 – Applied Engineering Fundamentals (2 training credits)	
Year 2 (33 + 4 training credits)	
Semester 1 (19 + 2 training credits)	**Semester 2 (14 + 2 training credits)**
AAE1003* Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation (1 credit)	AAE2005 Electrics and Electronic for Aeronautical Engineering
AAE2003 Introduction to Aircraft Systems	AMA2112 Mathematics II
AAE2004 Introduction to Aviation System and Air Transport Regulation	ENGXXX* Engineering Professional in Society II (2 credits)
AMA2111 Mathematics I	LCR III Chinese Language Subject
AP10006 Physics II	Service Learning ^
ENG2001 Fundamentals of Materials Science and Engineering	AAE3107 / IC385* Fundamentals of Aircraft Fabrication Techniques (2 training credits)
CAR II^	
AAE3106 / IC384* Fundamentals of Aircraft Engineering Practice (2 training credits)	
Year 3 (24 + 4 training credits)	
Semester 1 (12 + 2.5 training credits)	**Semester 2 (12 + 1.5 training credits)**
AAE3006 Safety, Reliability and Compliance	AAE3010 Airline Operations
AAE3009 Operations Research and Computational Analytics in Air Transport Operations	AAE3011 Aircraft Performance and Flight Management
AAE3012 Air Traffic Management and Airport Operations	AAE4014* Aviation Project Management
AAE4903 Human Factors in Aviation	AF3625 Engineering Economics
AAE3108 / IC386* Aircraft Inspection Practice (1 training credit)	
AAE3105 / IC389* Aviation Engineering Integrated Project (3 training credits)	
Year 4 (32 credits)	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE4301 Avionics Systems
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (3)
CAR III ^	Elective subject (4)
Elective Subject (1)	Free elective (2)
Elective Subject (2)	
AAE4012 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

** **New subjects are subject to approval.***

Table 4.2.4: BEngATE Normal Progression Pattern for student without Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics) or equivalent (Total credit requirement for graduation: 120 academic credits + 10 training credits)

Year 1 (31 + 2 training credits)	
Semester 1 (18 + 1 training credits)	**Semester 2 (13 +1 training credits)**
AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering (GUR-AIDA) (*2 credits*)	AAE1002 Innovation and Entrepreneurship in Green Aviation and Space Economy (GUR-IE) (*1 credit*)
AMA1110 Basic Mathematics I	APSS1L01 Tomorrow's Leaders
ENG1004 Engineering Professional in Society I (1 credits)	ENG2002 Computer Programming
CAR I^	AMA1120 Basic Mathematics II (Faculty Elective II)
AP10001 Introduction to Physics (Free elective (1))	LCR II
AP10005 Physics I (Faculty Elective I)	
LCR I	
Healthy Lifestyle (non-credit bearing) ^	
AAE2103/IC2117 – Applied Engineering Fundamentals (2 training credits)	
Year 2 (33 + 4 training credits)	
Semester 1 (19 + 2 training credits)	**Semester 2 (14 + 2 training credits)**
AAE1003* Introduction to Generative Artificial Intelligence and Digital Legacy in Aviation (1 credit)	AAE2005 Electrics and Electronic for Aeronautical Engineering
AAE2003 Introduction to Aircraft Systems	AMA2112 Mathematics II
AAE2004 Introduction to Aviation System and Air Transport Regulation	ENGXXX* Engineering Professional in Society II (2 credits)
AMA2111 Mathematics I	LCR III Chinese Language Subject
AP10006 Physics II	Service Learning ^
ENG2001 Fundamentals of Materials Science and Engineering	AAE3107 / IC385* Fundamentals of Aircraft Fabrication Techniques (2 training credits)
CAR II^	
AAE3106 / IC384* Fundamentals of Aircraft Engineering Practice (2 training credits)	
Year 3 (24 + 4 training credits)	
Semester 1 (12 + 2.5 training credits)	**Semester 2 (12 + 1.5 training credits)**
AAE3006 Safety, Reliability and Compliance	AAE3010 Airline Operations
AAE3009 Operations Research and Computational Analytics in Air Transport Operations	AAE3011 Aircraft Performance and Flight Management
AAE3012 Air Traffic Management and Airport Operations	AAE4014* Aviation Project Management (TBC)
AAE4903 Human Factors in Aviation	AF3625 Engineering Economics
AAE3108 / IC386* Aircraft Inspection Practice (1 training credit)	
AAE3105 / IC389* Aviation Engineering Integrated Project (3 training credits)	
Year 4 (32 credits)	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE4301 Avionics Systems
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (3)
CAR III ^	Elective subject (4)
Elective Subject (1)	Free elective (2)
Elective Subject (2)	
AAE4012 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

** **New subjects are subject to approval.***

4.3 Work-Integrated Education (WIE)

In accordance with the University regulations, all full-time UGC-funded undergraduate degrees should fulfil the mandatory requirement of Work-Integrated Education (WIE). WIE is "work-based learning experiences which take place in an organisational context relevant to a student's future profession, or the development of generic skills that will be valuable in that profession." It offers students the opportunity to learn to connect classroom theory with practical workplace applications through on-the-job work placements. In order to graduate from this programme, students are required to spend at least 2 weeks of full-time WIE training before graduation.

Possible activities, subject to prior approval by the Scheme Leader or Programme Leader, to fulfil WIE requirements are as follows:

- Internship opportunities organised by the Departmental/ Careers and Placement Section (CPS) of the Student Affairs Office (SAO);
- Summer placement in industrial/commercial sector;
- Placement in industrial /commercial sector during the period of deferment of study/zero-subject enrolment; and
- Conduct in a form proposed by students with the prior approval of the Scheme Leader or Programme Leader.

4.4 Industrial Centre (IC) Training

Industrial Centre (IC) training is aimed at providing students hands-on experience on dealing with different engineering projects under the supervision of academic and technical staff at the Industrial Centre (IC) of the University. They are graded in the same manner as other taught subjects from A+ to F and will be counted in the Grade Point Average (GPA). However, they will not be counted towards the credit requirement of the award or contribute to the Award/Weighted GPA. Students must pass the IC training stipulated in the curriculum in order to be considered for the award.

4.5 Student Exchanges

Exchanges to universities overseas for a semester or an academic year are possible through various exchange schemes organised by the University, Faculty or Department. While the number of exchanges is limited, students are encouraged to participate to enhance their all-roundedness and broaden their experience.

Block credit transfer may be given to exchange-out students. However, in order to ensure attaining the pre-requisite knowledge for smooth integration of study in the programme, students will be counselled on subject selection in the visited Universities before they leave for the exchange.

4.6 Summer Internship

The University encourages students to take summer internship offered by relevant industrial sectors to acquire practical insights on how the industry works and practices in a specific aviation sector. The internship programme normally takes place for three months starting from June to August. Some students may spend this period to attend training arranged by the industry or prepare for licensed paper examination if necessary. Continued works done by the students may be possible to proceed to their final year capstone project if approval is sought from the Programme Leader.

4.7 Capstone Project

All students are required to complete a capstone project (group-based) in the final year of study which is counted for 6 academic credits. The aim of the project is to provide students an opportunity to utilise and integrate their knowledge of aeronautical and aviation engineering to solve real life problems.

4.8 Curriculum Mapping with Programme Learning Outcomes

An analysis of the curriculum in terms of the coverage of the programme intended learning outcomes of Bachelor of Engineering (Honours) in Aviation Engineering and Bachelor of Engineering (Honours) in Air Transport Engineering, respectively (as shown in Sections 3.3 and 3.4, respectively), is presented in Tables 4.8.1 to 4.8.3. The tables indicate the subjects of Major requirements, elective and training natures that we Teach (T) students, give students Practice (P) and Measure (M) achievement of the Intended Learning Outcomes (ILOs). In summary, the curriculum address two programme learning outcomes which students are expected to achieve (A) professional/academic knowledge and skills (PAK), and (B) professional outlook and workplace skills (POW). There are six items for PAK and five items for POW. The technical elective subjects are updated continually to meet the need of the ever-evolving industrial communities in Hong Kong and the South China region. Essentially, they cover most of the programme learning outcomes with variations of themes from subject to subject. The subject learning outcomes to be achieved by every subject of the programme are listed in the syllabi as shown in Part B of this document.

Table 4.8.1: Curriculum Map for Subjects with ILOs of BEngAE

Subject Code	Intended Learning Outcomes (ILOs) of the BEngAE Programme										
	PAK						POW				
	a	b	c	d	e	f	a	b	c	d	e
AAE1003	TP			TP			TP				TP
AAE2003					TPM	TPM	TPM				
AAE2004					TPM				TPM		TPM
AAE2005	TPM	TPM									
AAE3001	TPM			TPM							
AAE3002	TPM	TPM	TPM								
AAE3003				TPM			TPM		TPM		
AAE3004	TPM	TPM					TPM				
AAE3008					TPM						TPM
AAE4002	TPM	TPM	TP	TPM	TPM	TP	TP	TPM	TP	TPM	TPM
AAE4004					TPM			TPM	TPM		
AAE4006	TPM		TPM								
AAE4301	TPM	TP		TPM	TP	TPM					
AF3625				TP	TP						
AMA1110	TP										
AMA1120	TP										
AMA2111	TP										
AMA2112	TP										
AP10005	TP										
AP10006	TP										
ELC3531										TPM	
ENG1004							TP		TP		TP
ENGXXX							TPM		TPM		TPM
ENG2001	TP	TP									
ENG2002				TPM							
ME23001	TP					TP					
AAE2103/ IC2117			TP			TP					
AAE3106 / IC384				TP	TP	TP		TP		TP	TP
AAE3107/ IC385					TP	TPM					
AAE3108/ IC386			TPM			TPM			TPM		
AAE3105/ IC389								TPM		TPM	TPM

T – TEACH; P – PRACTICE; M – MEASURED

Table 4.8.2: Curriculum Map for DSR Subjects with ILOs of BEngATE

Subject Code	Intended Learning Outcomes (ILOs) of the BEngATE Programme										
	PAK						POW				
	a	b	c	d	e	f	a	b	c	d	e
AAE1003	TP			TP			TP				TP
AAE2003					TPM	TPM	TPM				
AAE2004					TPM				TPM		TPM
AAE2005	TPM	TPM									
AAE3006							TPM		TPM		TPM
AAE3009	TPM	TPM		TPM							
AAE3010	TPM		TPM		TPM						
AAE3011			TPM	TPM				TPM			
AAE3012	TPM	TPM					TPM				
AAE4004					TPM			TPM	TPM		
AAE4012	TPM	TPM	TP	TPM	TPM	TP	TP	TPM	TP	TPM	TPM
AAE4014								TPM		TPM	TPM
AAE4301	TPM	TP		TPM	TP	TPM					
AAE4903	TPM	TPM	TPM								
AF3625				TP	TP						
AMA1110	TP										
AMA1120	TP										
AMA2111	TP										
AMA2112	TP										
AP10005	TP										
AP10006	TP										
ELC3531										TPM	
ENG1004							TP		TP		TP
ENGXXX							TPM		TPM		TPM
ENG2001	TP	TP									
ENG2002				TPM							
AAE2103/ IC2117			TP			TP					
AAE3106 / IC384				TP	TP	TP		TP		TP	TP
AAE3107/ IC385					TP	TPM					
AAE3108/ IC386			TPM			TPM			TPM		
AAE3105/ IC389								TPM		TPM	TPM

T – TEACH; P – PRACTICE; M – MEASURED

Table 4.8.3: Curriculum Map for Common Elective Subjects with ILO of BEngAE and BEngATE

Subject Code	Programme Learning Outcomes of both BEngAE and BEngATE Programmes										
	PAK						POW				
	a	b	c	d	e	f	a	b	c	d	e
Aviation Services Engineering											
AAE3012#	TP	TP					TP				
AAE4009		TP		TP			TP				
AAE4013	TP							TP		TP	
AAE4015				TP	TP		TP				
AAE4304	TP			TP			TP				
AAE4902					TP				TP	TP	TP
AAE4903#	TP	TP	TP								
AAE4904	TP			TP				TP		TP	
Aeronautical Engineering											
AAE4011		TP	TP								TP
AAE4105	TP	TP				TP			TP		TP
AAE4111	TP			TP							
AAE4112		TP		TP				TP		TP	
AAE4113	TP		TP						TP		
AAE4202	TP		TP	TP		TP	TP				
AAE4203	TP			TP		TP				TP	TP
Aircraft Maintenance Engineering											
AAE4107	TP				TP	TP	TP				
AAE4108	TP			TP				TP	TP		
AAE4109	TP			TP				TP	TP		
AAE4110	TP				TP	TP	TP				

For BEng AE only

T – TEACH; P – PRACTICE

4.9 Curriculum Design for Senior Year Intakes of BEngAE and BEngATE

4.9.1 Credit Requirements for Graduation

Normally 64 (plus 4 IC training credits)*
*Since students may be required to meet specific requirements at admission, the credits required for graduation will vary according to the academic background of students.

4.9.2 Work-Integrated Education (WIE)

In accordance with the University's policies, all full-time UGC-funded undergraduates should fulfill the mandatory requirement of Work-integrated Education (WIE). For details, please refer to Section 4.3.

4.9.3 General University Requirements (GUR) for BEngAE and BEngATE Senior Year Intakes

Areas	Credits
▪ Language and Communication Requirements (LCR)	(see *Note 1*)
▪ Service-Learning	3
▪ Cluster-Area Requirements (CAR) o 3 credits from CAR (M) "Chinese History and Culture" o 3 credits from a specially-designed CAR (A) "Human Nature, Relations and Development" (CAR A – English Language) subject with embedded English Reading and Writing Requirements within the first year of study o Students must also fulfil the Reading and Writing Requirement in English and Chinese (CR/CW and ER/EW)	6
▪ Essential Components of General Education (E-modules) 1. Academic Integrity 2. Artificial Intelligence and Data Analytics 3. Innovation and Entrepreneurship 4. National Education	Non-credit-bearing
Total GUR credits	9

Note 1: Only those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in Associate Degree/ Higher Diploma programmes and their academic performance) will be required to take degree LCR subjects (as stated in 6.14.4 and 6.14.5 below) on top of the normal curriculum requirement.

4.9.4 **Discipline-Specific Requirements (DSR) for BEngAE Senior Year Intakes**

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Discipline-Specific Requirements (DSR)			
AAE3001	Fundamentals of Aerodynamics	3	
AAE3002	Aircraft Structures and Materials	3	
AAE3003	Aircraft Propulsion Systems	3	
AAE3004	Dynamical Systems and Control	3	
AAE3008	Fundamental Thermal-fluid Science	3	
AAE4002	Capstone Project	6	Refer to SDF in Part B
AAE4004	Airworthiness and Regulations	3	
AAE4006	Flight Mechanics and Control Systems	3	
AAE4301	Avionics Systems	3	
AF3625	Engineering Economics	3	
CLC3243P	Chinese Communication for Aviation	2	
ELC3531	Professional Communication in English for Engineering Students	2	
ENG3004	Society and the Engineer	3	
ENG4001	Project Management	3	
Elective Subject I / II / III / IV (Students are required to complete four subjects from a pool of elective subjects as listed in Table 4.1.4)		12	
AAE3102/ IC380	Integrated Aviation Engineering Project	4 (TRN)	
Total number of DSR credits		**55 credits + 4 Training Credits**	

4.9.5 **Discipline-Specific Requirements (DSR) for BEngATE Senior Year Intakes**

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Discipline-Specific Requirements (DSR)			
AAE3006	Safety, Reliability and Compliance	3	
AAE3009	Operations Research and Computational Analytics in Air Transport Operations	3	
AAE3010	Airline Operations	3	
AAE3011	Aircraft Performance and Flight Management	3	
AAE3012	Air Traffic Management and Airport Operations	3	
AAE4004	Airworthiness and Regulations	3	
AAE4012	Capstone Project	6	Refer to SDF in Part B
AAE4301	Avionics Systems	3	
AAE4903	Human Factors in Aviation	3	
AF3625	Engineering Economics	3	
CLC3243P	Chinese Communication for Aviation	2	
ELC3531	Professional Communication in English for Engineering Students	2	
ENG3004	Society and the Engineer	3	
ENG4001	Project Management	3	
Elective Subject I / II / III / IV (Students are required to complete four subjects from a pool of elective subjects as listed in Table 4.1.4)		12	
AAE3102/ IC380	Integrated Aviation Engineering Project	4 (TRN)	
Total number of DSR credits		**55 credits + 4 Training Credits**	

4.10 Normal Progression Pattern of Senior Year Intakes

Table 4.10.1 and Table 4.10.2 outline the normal 2-Year Study Pattern for BEngAE and BEngATE Senior Year Intake respectively.

Table 4.10.1: **Normal Study Pattern of BEngAE Senior-Year Intakes**

(Total credit requirement for graduation: 64 academic credits + 4 training credits)

Year 1 (33 + 4 training credits)	
Semester 1 (15 + 2 training credits)	**Semester 2 (18 + 2 training credits)**
AAE3002 Aircraft Structures and Materials	AAE3001 Fundamentals of Aerodynamics
AAE3004 Dynamical Systems and Control	AAE3003 Aircraft Propulsion Systems
AAE3008 Fundamental Thermal-fluid Science	AAE4006 Flight Mechanics and Control Systems
CAR I ^ # (suggest taking CAR A – English Language) [#]	ENG3004 Society and the Engineer
Elective Subject (1)	Elective Subject (2)
	Service Learning ^
AAE3102/ IC380 Integrated Aviation Engineering Project (4 training credits)	
Year 2 (31 credits)	
Semester 1 (16 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE4301 Avionics Systems
CAR M^	AF3625 Engineering Economics
CLC3243P Chinese Communication for Aviation *(2 credits)*	ENG4001 Project Management
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (4)
Elective Subject (3)	
AAE4002 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

[#] *Students are recommended to complete CAR A – English Language in the first year of study.*

Table 4.10.2: **Normal Study Pattern of BEngATE Senior-Year Intakes**

(Total credit requirement for graduation: 64 academic credits + 4 training credits)

Year 1 (33 + 4 training credits)	
Semester 1 (15 + 2 training credits)	**Semester 2 (18 + 2 training credits)**
AAE3009 Operations Research and Computational Analytics in Air Transport Operations	AAE3006 Safety, Reliability and Compliance
AAE3012 Air Traffic Management and Airport Operations	AAE3011 Aircraft Performance and Flight Management
AAE4903 Human Factors in Aviation	AF3625 Engineering Economics
CAR I ^# (suggest taking CAR A – English Language) [#]	ENG3004 Society and the Engineer
Elective Subject (1)	Elective Subject (2)
	Service Learning ^
AAE3102/ IC380 Integrated Aviation Engineering Project (4 training credits)	
Year 2 (31 credits)	
Semester 1 (16 credits)	**Semester 2 (15 credits)**
AAE4004 Airworthiness and Regulations	AAE3010 Airline Operations
CAR M^	AAE4301 Avionics Systems
CLC3243P Chinese Communication for Aviation *(2 credits)*	ENG4001 Project Management
ELC3531 Professional Communication in English for Engineering Students *(2 credits)*	Elective Subject (4)
Elective Subject (3)	
AAE4012 Capstone Project (6 credits)	

^ *The study pattern for these GUR subjects is indicative only. Students may take the subjects at their own schedule.*

[#] *Students are recommended to complete CAR A – English Language in the first year of study.*

5. Management and Operation

5.1 Departmental Undergraduate Programme Committee

The Departmental Undergraduate Programme Committee (DUPC) will exercise the overall academic and operational responsibility for the Scheme/Programme and their development within defined policies, procedures and regulations.

5.2 Programme Executive Group

The day-to-day operation of the programme will be carried out by the Programme Executive Group, which consists of the Scheme Leader, Programme Leader and Deputy Programme Leader. The Group reports back to the DUPC.

5.3 Student-Staff Consultative Group

A Student-Staff Consultative Group (SSCG) is set up as the formal channel for soliciting student feedback. It consists of student representatives and teaching colleagues of the programme. The Group is normally chaired by the Scheme Leader, Programme Leader/Deputy Programme Leader. It meets on a need basis and should meet at least once every semester to discuss student workload, teaching and learning methods, balance between subject areas, training matters and other areas of mutual concern, and to report and make recommendations to the DUPC when necessary.

5.4 Academic Advising

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

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

All full-time undergraduate students will be assigned to one full-time academic staff from his/her Major Department who will act as his/her academic advisor throughout his/her course of study at PolyU.

The main responsibilities of the Designated Academic Advisor will include:

a) Building rapport with the students. serving as a bridge that connects them to the department;
b) Being accessible and available to students, and responding to their questions and concerns;
c) Helping student to consider and clarify their intellectual, professional and personal goals;
d) Helping students to develop an appropriate study plan and assisting in their selection of appropriate courses in their major study and GUR so as to achieve their identified goals and holistic development;
e) Helping students to understand academic regulations and requirements; and
f) Identifying students with special learning needs or early signs of learning problems, and referring/encouraging them to seek help or support.

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

- Meet with their Designated/ Auxiliary Academic Advisors at least twice per year.
- Understand the academic regulations and requirements of their chosen Major/programme, as well as the GUR requirements;
- Actively obtain information and seek out advisors and resources on a regular basis and as needed; and
- Take the final responsibility for making decisions and choices regarding their academic study based on the information and advice given.

6. Academic Regulations

The academic regulations described below are based on the information known as of July 2025. 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' studies is also published in the Student Handbook *(website: https://www.polyu.edu.hk/en/ar/students-in-taught-programmes/student-handbook/)*.

6.1 Subject Registration and Withdrawal

6.1.1 In addition to programme registration, students need to register for the subjects at specified periods prior to the commencement of the semester. An add/drop period will also be scheduled for each semester/term. Students may apply for withdrawal of their registration on a subject after the add/drop period and before the commencement of the examination period if they have a genuine need to do so. The application should be made to the relevant programme offering Department and will require the approval of both the subject lecturer and the 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.

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

6.1.3 Subject to the maximum study load of 21 credits per semester and the availability of study places, students are allowed to take additional subjects on top of the prescribed credit requirement for award before they become eligible for graduation. Students will be allowed to take additional subjects for broadening purpose, after they fulfil the graduation requirements and for the following semester. However, they will still be subject to the maximum study load of 21 credits per semester and the availability of places in the subjects concerned, and their enrolment will be arranged as subject-based students only and be subject to the rules on 'Admission of Subject-based Students', except that graduates from UGC-funded programmes will not be restricted to taking only subjects from a self-financed programme.

6.2 Study Load

6.2.1 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. Students cannot drop those subjects assigned by the department unless prior approval has been given by the department.

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

6.2.3 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 relevant authorities concerned.

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

6.2.5 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.

6.3 Subject Exemption

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

6.4 Credit Transfer

6.4.1 Students may be given credits for recognised previous studies (including mandatory General University Requirements (GUR) subjects; and the credits will be counted towards meeting the requirements for award/degree. Transferred credits may not normally be counted towards more than one degree. The granting of credit transfer is a matter of academic judgment.

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

6.4.3 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. However, for students admitted to an Articulation Degree or Senior Year curriculum, which is already a reduced curriculum, they should not be given credit transfer for any required GUR subjects, and are required to complete at least 60 credits in order to be eligible for a Bachelor's award.

6.4.4 If a student is waived from a particular stage of study on the basis of advanced qualifications held at the time of admission, the student concerned will be required to complete fewer credits for award. For these students, the 'deducted' credits at admission stage will be counted towards the maximum limit for credit transfer when students apply for further credit transfer after their admission. This also applies to students admitted to an Articulation Degree or Senior Year curriculum when they claim further credit transfer after admission.

6.4.5 All credit transfers approved will take effect 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.

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

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

6.5 Deferment of study

6.5.1 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.

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

6.5.3 Where the period of deferment of study begins during a stage for which fees have been paid, no refund of such fees will be made.

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

6.6 General Assessment Regulations

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

6.6.2 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.

6.6.3 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.

6.6.4 The language of assessment for all programmes/subjects shall be English, unless approval is given for it to be otherwise.

6.7 Principles of Assessment

6.7.1 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.

6.7.2 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.

6.7.3 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 (BoE) 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.

6.8 Assessment Methods

6.8.1 Students' performance in a subject is 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.

6.8.2 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.

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

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

6.9 Progression/Academic Probation/Deregistration

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

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

When a student has a Grade Point Average (GPA) (see para. 6.12.3 below) lower than 1.70, he/she will be put on academic probation in the following semester. If a student is able to pull his/her GPA up to 1.70 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the assessment result notification but not in the transcript of studies.

6.9.2 A student will have 'progressing' status unless he/she 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 the programme, as specified in the Programme Requirement Document, unless approval has been given for extension; or
(ii) the student has reached the maximum number of retakes allowed for a failed compulsory subject; or
(iii) the student's GPA is lower than 1.70 for two consecutive semesters and his/her Semester GPA in the second semester is also lower than 1.70; or
(iv) the student's GPA is lower than 1.70 for three consecutive semesters.

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

6.9.3 A student may be de-registered from the programme enrolled before the time frame specified in para. 6.9.2(iii) and (iv) above if his academic performance is poor to the extent that the Board of Examiners deems that his/her chance of attaining a GPA of 1.70 at the end of the programme is slim or impossible.

6.9.4 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.

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

6.10 Retaking of Subjects

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

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

6.10.3 In cases where a student takes another subject to replace a failed elective subject, the fail grade will be taken into account in the calculation of the GPA, despite the passing of the replacement subject. Likewise, students who fail a Cluster Area Requirement (CAR) subject may need to take another subject from the same Cluster Area in order to fulfil this part of the GUR, since the original CAR subject may not be offered; in such cases, the fail grade for the first CAR subject will be taken into account in the calculation of the GPA, despite the passing of the second CAR subject.

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

6.10.5 Students who have filed 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.

6.11 Exceptional Circumstances

Absence from an assessment component

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

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

Assessment to be completed

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

Aegrotat award

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

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

6.11.6 The acceptance of an aegrotat award by a student shall disqualify him from any subsequent assessment for the same award.

6.11.7 An aegrotat award shall normally not be classified, and the award parchment shall not state that it is an aegrotat award. However, the Board of Examiners may determine whether the award should be classified, provided that they have adequate information on the students' academic performance.

Other particular circumstances

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

6.12 Grading

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

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

'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+

6.12.2 A numeral grade point is assigned to each subject grade, as follows:

Grade	*Grade Point*
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

6.12.3 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 code '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.

6.13 Different Types of GPA's

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

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

6.13.3 Along with the 'cumulative' GPA, a Weighted GPA will also be calculated, to give an indication to the Board of Examiners on the award classification which a student will likely get if he makes steady progress on his academic studies.

6.13.4 When a student has satisfied the requirements for award, an Award GPA will be calculated to determine his award classification.

6.13.5 For students taking the Major/Minor study route (see para. 6.18 for details), separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for Board of Examiners to moderate the award classification for the Major, as explained further in para. 6.15.4.

6.14 University Graduation Requirements

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

(i) Complete successfully the requisite number of credits as defined in para. 4.1.
(ii) Earn a cumulative GPA of 1.70 or above at graduation.
(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component.
(iv) Satisfy the residential requirement for at least one-third of the credits required for the award.
(v) Satisfy the following GUR requirements:

Normal Year One Intake

Areas	Credits
Language and Communication Requirements (LCR)	9
Artificial Intelligence and Data Analytics (AIDA)	2
Innovation and Entrepreneurship (IE)	1
Leadership Education and Development	3
Service-Learning	3
Cluster-Area Requirements (CAR) (3 credits from each of the 4 cluster areas)	9
Healthy Lifestyle (non-credit bearing)	Nil
Total GUR credits	27

Senior Year Intakes

Areas	Credits
Language and Communication Requirements (LCR)	(see *Note*)
Service-Learning	3
Cluster-Area Requirements (CAR) o 3 credits from CAR (M) o 3 credits from a specially-designed CAR (A) – English Language	6
Essential Components of General Education (E-modules)	Non-credit-bearing
Total GUR credits	9

Note: Senior year intake students not meeting the equivalent standard of Undergraduate Degree LCR (based on their previous studies in Associate Degree/ Higher Diploma programmes and their academic performance) will be required to take degree LCR subjects (as stated in 6.14.4 and 6.14.5 below) on top of the normal curriculum requirement.

(vi) Satisfy any other requirements as specified in the *Programme Requirement Document*.

6.14.2 There are subjects which are designed to fulfil the credit requirement of different types of subjects. Students passing these subjects will be regarded as having fulfilled the credit requirements of the particular types of subjects concerned. Nevertheless, the subject passed will only be counted once in fulfilling the credit requirements of the award, and the students will be required to take another subject in order to meet the total credit requirement of the programme concerned. Level-0 subjects and training subjects (including clinical/field training) will not be counted to fulfil free elective requirement for graduation purpose.

Language and Communication Requirements (LCR)

6.14.3 LCR comprises four major components of the overall English and Chinese language requirements as described below in order to be eligible for graduation:

(i) Language and Communication Requirements (LCR) in English (6 credits) and Chinese (3 credits);
(ii) Writing Requirement (W);
(iii) Reading Requirement (R); and
(iv) Discipline-Specific Language Requirement (2 credits each in English and Chinese).

<u>*English*</u>

6.14.4 All undergraduate students must successfully complete two 3-credit English language subjects as stipulated by the University, according to their English language proficiency level (Table 1). These subjects are designed to suit students' different levels of English language proficiency at entry, as determined by their HKDSE score or the English Language Centre (ELC) entry assessment (when no HKDSE score is available, e.g. in the case of non-local students).

Table 1: English LCR subjects (each 3 credits)

English language competence level / Subject	Practical English for University Studies (ELC1011)	English for University Studies (ELC1012/ ELC1013)	Any LCR Proficient level elective subject in English (Table 2)
HKDSE Level 4 and above or equivalent	--	Subject 1	Subject 2
HKDSE Level 3 or equivalent	Subject 1	Subject 2	--

Table 2: Proficient level elective subjects for DSE Level 4 students and above (or equivalent) (each 3 credits)

	Subject Title	Subject Code
LCR Proficient level elective subjects	Advanced English Reading and Writing Skills	ELC2011
	Persuasive Communication	ELC2012
	English in Literature and Film	ELC2013
	Advanced English for University Studies	ELC2014

Chinese

6.14.5 All undergraduate students are required to successfully complete one 3-credit Chinese language subject as stipulated by the University, according to their Chinese language proficiency level.

Table 3: Chinese LCR subjects (each 3 credits)

Subject Code	Subject Title	MOI
CLC1104C	University Chinese	Cantonese
CLC1104P	University Chinese	Putonghua

For non-Chinese speaking students or students whose Chinese standards are at junior secondary level or below:

Depending on your Chinese language background and/or previous exam results, you might be exempted from the CLCR at the time of admission. You may use a CLCR subject or free elective to fulfil the credit requirement. You are also exempted from fulfilling the CR/CW of CAR.

Otherwise, one subject from Table 4 will be pre-assigned to you as Chinese LCR depending on your Chinese language proficiency and/or previous exam results. You might be given an assessment to ascertain that the pre-assigned subject is suitable for you.

Table 4: Chinese LCR Subjects for non-Chinese speakers or students whose Chinese standards are at junior secondary level or below

Subject Code	Subject Title
CLC1151	Chinese I (for non-Chinese speaking students)
CLC1152	Chinese II (for non-Chinese speaking students)
CLC2151	Chinese III (for non-Chinese speaking students)
CLC2154	Chinese IV (for non-Chinese speaking students)
CLC2152	Chinese Literature – Linguistic and Cultural Perspectives (for non-Chinese speaking students)

Discipline-Specific Language Requirement

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

Students who are non-Chinese speakers or those whose Chinese standards are at junior secondary level or below will be exempted from the Discipline-Specific Chinese Language requirement, i.e. *CLC3243P Chinese Communication for Aviation*. These students must take another subject (except Level-0 subjects and training subjects (including clinical/field training)) to make up for the total credit requirement.

Artificial Intelligence and Data Analytics Requirement (GUR-AIDA)

6.14.7 GUR-AIDA subjects aim to help students demonstrate an understanding of the foundational concepts of AIDA, acquire basic skills in using AIDA technologies and applications, articulate examples of how the adoption AIDA could enhance their chosen disciplines and demonstrate an awareness of global contemporary ethical issues and impact from AIDA applications in daily life.

4-Year Degree Students are required to complete a 2-credit for GUR-AIDA within the first year of study.

Senior Year Intakes students are required to take the mandatory subject "Essential Components of General Education" for the e-module on GUR-AIDA.

Innovation and Entrepreneurship Requirement (GUR-IE)

6.14.8 GUR-IE subjects aim to help students to demonstrate an elementary understanding of innovation and entrepreneurship, appreciate the importance of innovation and entrepreneurship in local and global community, appreciate the applications and implications of the latest technologies on entrepreneurship and innovation in their chosen disciplines and identify ethical issues in entrepreneurship and innovation.

4-Year Degree Students are required to complete a 1-credit for GUR-IE within the first year of study.

Senior Year Intakes students are required to take the mandatory subject "Essential Components of General Education" for the e-module on GUR-IE.

Essential Components of General Education

6.14.9 Senior Year Intakes students are required to take "Essential Components of General Education", and complete and pass the individual e-modules of the four components within the first year of study (Semesters 1 and 2). The "Online Tutorial on Academic Integrity" should be completed by Week 5 of Semester 1.

Leadership Education and Development (LEAD)

6.14.10 All students must successfully complete one 3-credit subject in the area of Leadership Education and Development. LEAD aims to introduce students to the concepts and theories of leadership and to prepare the students to become ethical leaders. The "Online Tutorial on Academic Integrity", National Education and the "learning-to learn" component are embedded in the LEAD subjects.

A list of designated subjects for meeting the leadership education and development requirement is available at: https://www.polyu.edu.hk/cus/GURSubjects/

Service-Learning (SL)

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

These subjects may take the form of:

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

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

A list of designated subjects for meeting the service-learning requirement is available at: https://www.polyu.edu.hk/cus/GURSubjects/

Cluster Areas Requirement (CAR)

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

- Human Nature, Relations and Development (CAR A)
- Science, Technology and Environment (CAR D)
- Chinese History and Culture (CAR M)
- Cultures, Organisations, Societies and Globalisation (CAR N)

A list of CAR subjects under each of the four Cluster Areas is available at: https://www.polyu.edu.hk/cus/GURSubjects/

Reading and Writing Requirements in CAR

There are two additional requirements in CAR:

i. English Reading and Writing (ER/EW) Requirements
ii. Chinese Reading and Writing (ER/EW) Requirements

Senior Year Intakes Students shall complete one specially-designed CAR A – English Language subject (with embedded English Reading and Writing Requirements) (students should complete this CAR A – English Language subject within the first year of study), and one CAR M subject, and fulfil the Chinese Reading and Writing Requirements.

Writing Requirement

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

Reading Requirement

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

A list of approved CAR subjects for meeting the Writing Requirement (with a "W" designation) and for meeting the Reading Requirement (with an "R" designation) is available at: https://www.polyu.edu.hk/cus/GURSubjects/

Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements.

Healthy Lifestyle

6.14.15 A healthy lifestyle is the platform for all-round development. Students are required to successfully complete a non-credit-bearing programme in healthy lifestyle.

Students will be required to complete the following components: (i) sports training/participation, (ii) e-learning modules, and (iii) lectures/talks. The syllabus covers physical health, mental health, social health, spiritual health, values and priorities on health behaviour with reference to competing priorities in life, reflection on healthy living and plans for self-improvement or maintaining healthy behaviour.

Students taking the Major/Minor option

6.14.16 Students taking the Major/Minor option (also see details in para. 6.18) will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 1.70 or above and have also submitted an application for graduation. If the 18 credits taken for the approved Minor study can meet the requirements for that Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. Otherwise, students will graduate with a Major only.

6.14.17 Subject to approval by the Minor-offering department, students may count up to 6 credits from their Major/GUR *[including Language Communication Requirements (LCR) subjects at proficiency level]* towards their chosen Minor.

Students taking the Double Majors option

6.14.18 Students are required to obtain an overall GPA of at least 1.70 in order to satisfy the requirement for graduation with Double Majors (also see details in para. 6.18). They will not be allowed to graduate with one of the 2 Majors.

6.15 Guidelines for Award Classification

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

6.15.2 The Weighted GPA will be used as a guide to help determine award classifications. It is calculated as follows:

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

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

N = number of all subjects counted in GPA calculation as set out in para. 6.12.3, except those exclusions specified in para. 6.15.3.

For calculating the Weighted GPA (and Award GPA) to determine the Honours classification of students who satisfy the graduation requirements of Bachelor's degree awards, a University-wide standard weighting will be applied to all subjects of the same level, with a weighting of 2 for Level 1 and 2 subjects and a weighting of 3 for Level 3 and above subjects. Although the Industrial Centre training credits are counted in the GPA calculation, they are excluded from the calculation of weighted GPA and award GPA. Same as for GPA, Weighted GPA ranges from 0.00 to 4.30 from 2020/21.

6.15.3 Any subjects passed after the graduation requirement has been met or subjects taken on top of the prescribed credit requirements for award shall not be taken into account in the grade point calculation for award classification. However, if a student attempts more elective subjects (or optional subjects) than those required for graduation in or before the semester in which he/she becomes eligible for award, the elective subjects (or optional subjects), except for subjects which are selected by students to fulfill the free electives requirement for graduation, 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).

Students taking the Major (including the Major/ Secondary option)/Minor studies

6.15.4 For students who have completed a Major (including the Major/Secondary Major option)/ Minor programme, a single classification will be awarded and their award classification will mainly be based on the "Major GPA", but it can be moderated by the Board of Examiners with reference to the "Minor GPA". For students who have completed a Major programme combined with free electives, their award classification will be determined by their "Major GPA" which includes grades obtained for the free electives, if appropriate.

6.15.5 "Major GPA" is derived based on all subjects of the Major programme, as well as the Secondary Major programme, if any, including those meeting the mandatory General University Requirements (GUR) and programme-specific language requirement, but not necessarily including the training credits.

6.15.6 “Minor GPA” is derived based on the 18 credits of specific Minor programme. “Minor GPA” is unweighted.

6.15.7 The “Major GPA” and the “Minor GPA” will be presented separately to the Board of Examiners for consideration. The guidelines for determining award classification as stipulated in para. 6.16 below are applicable to programmes with Major (including the Marjor/ Secondary Major option)/Minor studies.

6.16 Classification of Awards

6.16.1 For Honours degree programmes, the awards will be classified as follows:

First Class Honours
Second Class Honours (Division 1)
Second Class Honours (Division 2)
Third Class Honours

6.16.2 The following are guidelines for Boards of Examiners' reference in determining award classifications:

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

6.16.3 Under exceptional circumstances, a student who has completed an Honours degree programme, but has not attained Honours standard, may be awarded a Pass-without-Honours degree. A Pass-without-Honours degree award will be recommended, when the student has demonstrated a level of final attainment which is below the 'essential minimum' required for graduation with Honours from the programme in question, but when he/she has nonetheless covered the prescribed work of the programme in an adequate fashion, while failing to show sufficient evidence of the intellectual calibre expected of Honours degree graduates. For example, if a student in an Honours degree programme has a Grade Point Average (GPA) of 1.70 or more, but his/her Weighted GPA is less than 1.70, he/she may be considered for a Pass-without-Honours classification. A Pass-without-Honours is an unclassified award, but the award parchment will not include this specification.

6.16.4 Students who have committed academic dishonesty or non-compliance with examination regulations will be subject to the penalty of the lowering of award classification by one level. For undergraduate students who should be awarded a Third class Honours degree, they will be downgraded to a Pass-without-Honours. The minimum of downgraded overall result will be kept at a Pass.

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

Honours classification	**Award GPA**
First Class Honours	3.60 - 4.30
Second Class Honours (Division 1)	3.00 - 3.59
Second Class Honours (Division 2)	2.40 - 2.99
Third Class Honours	1.70 - 2.39

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

6.17 Recording of Disciplinary Actions in Students' Records

6.17.1 Disciplinary actions against students' misconducts will be recorded in students' records.

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

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

6.17.4 The University reserves the right to withhold the issuance of any certificate of study and an award parchment to a student who has unsettled matters with the University, or subject to disciplinary action.

6.18 Minor Study and Double Majors

6.18.1 Under the framework of the 4-year undergraduate degree programmes, students can work for either a single discipline Major, a Major plus a Minor (unless the Major is so designed as to preclude the possibility of a further Minor study), or Double Majors.

Minor Study

6.18.2 Minor study will be a free choice by students and not mandatory. Each student is allowed to take not more than one Minor. This option will not be applicable to students who are admitted to the advanced stage of the programme. Students who opt for Minor study will be subject to the following regulations:

(a) A Minor programme will comprise a collection of subjects totalling 18 credits, with at least 50% of the subjects (9 credits) at Level 3 or above.

(b) Students must apply to and obtain approval from the Minor-offering Department, at the start of second year of study.

(c) Subject to approval by the Minor-offering Department, students may count up to 6 credits from their Major/GUR subjects *[including Language Communication Requirement (LCR) subjects at proficiency level]* towards their chosen Minor. Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme.

(d) Credit transfer can be given for not more than 9 credits of a Minor programme if the previous credits were earned from approved institutions outside of the university; and not more than 12 credits of a Minor programme if the previous credits were earned from programmes offered by PolyU.

(e) Only students with a GPA of 2.5 or above can be considered for Minor study enrolment. The Minor-offering Department can also set a quota and additional requirements for enrolment on their Minors.

(f) Departments have the discretion to allow students who fail to obtain a GPA of 2.5 or above after enrolment, to stay on the Minor programme for a longer while in order to pull up their GPA to the required level.

(g) Students must complete their approved Minor as part of their graduation requirements. Students who wish to withdraw from a Minor need to obtain approval from the Minor-offering Department, before the end of the add/drop period of the last Semester of study.

(h) Students are required to obtain a GPA of at least 1.70 in order to satisfy the requirement for graduation with a Major plus a Minor.

(i) Since students are expected to complete their approved Minor as part of their graduation requirements, students taking the Major/Minor route will be considered for an award of both the Major and Minor simultaneously, and not separately.

(j) Students graduating with a Major plus a Minor will receive one award parchment, which will list the title of the Major programme only. The honours classification will be based on the Major GPA, and reflected accordingly on the parchment. The award title of the Minor programme will not be reflected on the parchment. It will be recorded in the Transcript of Studies.

(k) There is no guarantee that a clash-free timetable can be provided for all students who pursue Minor study.

Double Majors

6.18.3 Double Majors will provide an opportunity for the more capable students, who are interested in expanding their study beyond a single degree, to take a Second Major study. Students who opt for a double Major study will be subject to the following regulations:

(a) Completion of Double Majors requires more than the normative study period of 4/5 years and extra credits on self-financed basis (i.e. higher tuition fee). The total credit requirements of a Double Major will depend on the degree of commonality between the 2 Majors, but should be more than 120 in all instances. Apart from the 30 credits of GUR subjects, up to 1/3 of the Discipline-Specific Requirements (DSR) of the First Major which are common to the Second Major can be double-counted towards the Second Major.

(b) Students who wish to take a Second Major must obtain approval from the host Department of the First Major.

(c) Only students with a GPA of 3.0 or above can be considered for admission to a Second Major, while Departments offering the Second Major can stipulate a higher GPA requirement if deemed appropriate.

(d) Students will be put on academic probation if they fail to obtain a GPA of 1.70 or above.

(e) Students who wish to withdraw from a Second Major must obtain approval from the Department offering the Second Major, before the end of the add/drop period of the last Semester of study.

(f) Students will not be allowed to drop the First Major and continue with the Second Major only. This is to avoid students using the Double Major mechanism to gain a 'backdoor' entry to a 'popular' and oversubscribed Major programme.

(g) Students are required to obtain an overall GPA of at least 1.70, in order to satisfy the requirement for graduation with Double Majors. They will not be allowed to graduate with one of the 2 Majors.

(h) Two award parchments will be issued for the Double Majors (one for each Major programme). The honours classification of the two Major awards need not be identical.

6.19 Graduation

A student is required to graduate as soon as he/she satisfies the graduation requirements as stipulated in para. 6.14 above. The student concerned is required to apply for graduation, in the semester in which he/she is able to fulfil all his/her graduation requirements, and after the add/drop period for that semester has ended.

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PART B SUBJECT SYLLABI

General University Requirements (GUR)

Subject Description Form

Subject Code	AAE1001
Subject Title	Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering
Credit Value	2
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The subject will provide students with 1. An overview and introduction of the basic concepts and techniques of intelligent automation and artificial intelligence in aerospace, aeronautical and aviation engineering; 2. The applications of data analytics in intelligent automation and artificial intelligence in the domain; and 3. Operational challenges, technological limitations, emerging technologies and future directions.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (i) Demonstrate an understanding of the foundational concepts of Artificial Intelligence and Data Analytics (AIDA); (ii) Acquire basic skills in using AIDA technologies and applications; (iii) Articulate examples of how the adoption AIDA could enhance their understanding on aeronautical and aviation engineering; and (iv) Demonstrate an awareness of global contemporary ethical issues and impact from AIDA applications in daily life.
Subject Synopsis/ Indicative Syllabus	The subject covers the following topics. Fundamental and the elements of statistical learning – variable types, terminology, statistical decision theory, statistical models. Introduction to model nature and selections in aerospace, aeronautical and aviation engineering – regression, classification, smoothing methods, model assessment and selection, model inference and averaging, decision trees, neural networks, prototype methods, nearest-neighbours. Overview of supervised learning in aerospace, aeronautical and aviation engineering – linear models, least squares, nearest-neighbour methods, structured regression models..

	Overview of unsupervised learning in aerospace, aeronautical and aviation engineering – association rules, cluster analysis, independent component analysis, random forests. Case studies on aeronautical engineering with AI technologies – UAS concept, UAV path planning, brief introduction of autonomous flights, brief introduction of AI in aircraft system and their global impact and contributions to social sustainability and urban air mobility and smart city. Case studies on aviation engineering with AI technologies – delay and delay propagation prediction, air route network analysis, safety analysis, and understanding the importance of aviation safety and airline social responsibility. Data compliances, ethical issue in data analytics, handling sensitive data, corporate data and customer profile – importance of non-disclosure agreement, protection against unintended or intended consequences of the use of data and results of the data analytics, human rights and privacy (e.g. aerial photography, leakage of airline customer data, unauthorised use of passengers' behaviour data for promotion). Legal and ethical consideration in artificial intelligence in aerospace and aviation engineering – Global legislations and safety considerations from ICAO, civil aviation authority and airworthiness, human equality in space exploration, responsibility of unexpected events, incidents and accident, and bias in the use of AI.
Teaching/Learning Methodology	**1. e-Learning Module** The e-learning module is developed and delivered by the Department of Computing at PolyU, consisting of readings, exercises and assessments that are designed to introduce students to the basic concept and practice of AIDA. The e-learning module will provide basic foundation concepts about AIDA, as well as their potential global and societal context impacts. A brief understanding about the technology and applications will also be provided. Students are required to successfully complete the e-learning module (including video watching, an after-class exercise, and a lab with the AIDA interactive playground) within the first seven weeks of the semester in which they are taking the subject. **2. Lectures and Laboratories** Lectures are used to deliver the fundamental knowledge in relation to various aspects of machine learning, data mining, data analytics, data-driven optimisation and artificial intelligence in airline and airport operations.

Several laboratories will be made available to equip students with the basic knowledge of data mining, soft computing, optimisation and artificial intelligence in solving aerospace, aeronautical and aviation engineering problems.

Given the basic knowledge of data science, a group mini project will be used to help students deepen their knowledge of a specific topic through literature study, methodology study, analysis of data, dissemination of research findings and report writing.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	(i)	(ii)	(iii)	(iv)
1. E-Learning module	✓	✓	✓	
2. Lecture	✓	✓	✓	✓
3. Laboratory	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		(i)	(ii)	(iii)	(iv)
1. e-Learning module	15%	✓	✓	✓	
2. Assignment	25%	✓	✓	✓	✓
3. Laboratory	35%	✓	✓	✓	
4. Group project and presentation	25%	✓	✓	✓	✓
Total	100%				

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

The continuous assessment (100%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via assignment, several laboratory teaching and laboratory report, numerical analysis, reading assignment. In particular, group projects are used to assess the students' capacities of self-study and problem-solving and effective communication skills in English so as to fulfil the requirements of working in the aviation industry. Assignment and laboratory will be conducted to evaluate the students' performance in problem selection, artificial intelligence design for satellite, aerospace and aviation engineering. E-Learning

	module aims to equip students with the basic concept and practice of AIDA.	
Student Study Effort Expected	**e-Learning module**	3 Hrs.
	Class contact	
	▪ Lecture	26 Hrs.
	Other student study effort	
	▪ A Literature review / Scientific finding and analysis / final report writing preparation / presentation material preparation	24 Hrs.
	▪ Self-study	24 Hrs.
	Total student study effort	77 Hrs.
Reading List and References	Barber, D. (2012). *Bayesian reasoning and machine learning*. Cambridge University Press. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to algorithms: MIT press. De Neufville, R., & Odoni, A. (2003). Airport systems. planning, design and management. New York: McGraw-Hill. Guido, S., & Müller, A. (2016). *Introduction to machine learning with python* (Vol. 282). O'Reilly Media. Marsland, S. (2015). *Machine learning: an algorithmic perspective*. CRC press. Wallwork, A. (2016). English for writing research papers: Springer. Wells, A. T. (2007). *Air transportation: A management perspective*: Ashgate Publishing, Ltd. Wu, C.-L. (2016). *Airline operations and delay management: insights from airline economics, networks and strategic schedule planning*: Routledge.	

June 2023

Subject Description Form

Subject Code	AAE1002
Subject Title	Innovation and Entrepreneurship in Green Aviation and Space Economy
Credit Value	1
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with 1. New technologies and business potentials in the field of green aviation, aviation technologies, aerospace and space technologies; and 2. Operational environments, innovation and entrepreneurship in aerospace and aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (i) Demonstrate an elementary understanding of innovation and entrepreneurship; (ii) Appreciate the importance of innovation and entrepreneurship in local and global community; (iii) Appreciate the applications and implications of the latest technologies on entrepreneurship and innovation in aeronautical and aviation engineering; and (iv) Identify ethical issues in entrepreneurship and innovation.
Subject Synopsis/ Indicative Syllabus	Identification of innovative ideas and emerging technologies in green aviation and space economy. Evaluation methods of the innovative solutions, market segment, business potential, market competitiveness, the difficulties of market entrance, methods of distributions channels, financial plan and business proposal planning and preparation; and competency in Innovation and Entrepreneurship. Management and organisation for innovation, strategy, structure and processes in the aviation and aerospace industry. Social impact, operational constraints, legal considerations, ethics of innovation and entrepreneurship in the aviation and aerospace industry. Green aviation – sustainable aviation fuel, solid-state battery for aviation, advanced air mobility and automation concepts, blue skies

<table>
<tr><td></td><td>and clean aviation energy, flight technology in achieving zero-net carbon emission, sustainable aircraft manufacturing.

Space economy – satellites navigation and launchers, orbital debris and CubeSat solutions, earth observation, UAS/UAV, space travel, space exploration, telecommunication and mobile services.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. e-Learning Module

The e-learning module is developed and delivered consisting of readings, exercises and assessments that are designed to introduce students to the basic concept and practice of IE.

The e-learning module will provide basic foundation concepts about IE, as well as their potential global and societal context impacts. A brief understanding about the innovation and entrepreneurship will also be provided.

Students are required to successfully complete the e-learning module of IE within the first seven weeks of the semester in which they are taking the subject.

2. Lectures

Lectures are used to deliver the successful start-up, new businesses and innovative technologies in green aviation and space economy in local, GBA, China, Asia Pacific regions and global. The social impact, operational, operational constraints, legal considerations and ethical issues will be discussed with real cases.

Given the basic knowledge of managing innovation and entrepreneurship in green aviation and space economy, the students are required to generate their new business solutions in green aviation and space economy via group discussion and project presentation.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes to be covered</td></tr>
<tr><td>(i)</td><td>(ii)</td><td>(iii)</td><td>(iv)</td></tr>
<tr><td>1. E-Learning module</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Group discussion</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>
</td></tr>
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<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</td></tr>
<tr><td>(i)</td><td>(ii)</td><td>(iii)</td><td>(iv)</td></tr>
<tr><td>1. E-learning module</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Class participation and participation in discussion</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>3. Group project presentation and business report</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>4. Reflection</td><td>25%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The continuous assessment (100%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via lectures and discussion. Group project presentation and business project proposal are going to facilitate the students' innovative idea generation and entrepreneurship skills in green aviation and space economy. Group project and business report and reflection will be conducted to evaluate the students' performance in innovation and entrepreneurship in green aviation and space economy. E-Learning module aims to equip students with the basic concept and practice of IE.
</td>
</tr>
<tr>
<td>Student Study Effort Expected</td>
<td>
<table>
<tr><td>e-Learning module</td><td>3 Hrs.</td></tr>
<tr><td>Class contact</td><td></td></tr>
<tr><td>▪ Lectures, group discussion</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort</td><td></td></tr>
<tr><td>▪ Project preparation, reflection</td><td>14 Hrs.</td></tr>
<tr><td>▪ Self-study</td><td>14 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>44 Hrs.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Reading List and References</td>
<td>
Aerospace technology (latest). Technology. https://www.aerospace-technology.com/sector/technology/

Agarwal, R. K. (2012). Review of technologies to achieve sustainable (green) aviation. Recent advances in aircraft technology, 19, 427-464.
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	Airport technology (latest). News. https://www.airport-technology.com/news/ Blockley, R. (2016). Green aviation. John Wiley & Sons. Petroni, G., and Bigliardi, B. (2019). The Space Economy: From Science to Market. Cambridge Scholars Publishing. Pullen G. S., and Williams, S. (2021). The Space Economy: Book Zero In The Space Economy Series. AbeBooks. International Airport Review (latest). News. https://www.internationalairportreview.com/news/ The American Institute of Aeronautics and Astronautics (latest). AIAA industry news, and press releases. https://www.aiaa.org/news

March 2023

The Hong Kong Polytechnic University

Subject Description Form

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

☐ Healthy Lifestyle
☐ AI and Data Analytics (AIDA)
☐ Innovation and Entrepreneurship (IE)
☐ Languages and Communication Requirement (LCR)
☒ Leadership Education and Development (LEAD)
☐ Service-Learning
☐ Cluster-Area Requirement (CAR)
☐ Human Nature, Relations and Development [CAR A]
☐ Science, Technology and Environment [CAR D]
☐ Chinese History and Culture [CAR M]
☐ Cultures, Organizations, Societies and Globalization [CAR N]
☐ China-Study Requirement
☐ Yes or ☐ No
☐ Writing and Reading Requirements
☐ English or ☐ Chinese</td></tr>
<tr><td>Pre-requisite / Co-requisite/ Exclusion</td><td>Nil</td></tr>
<tr><td>Assessment Methods</td><td>
<table>
<tr><th>100% Continuous Assessment</th><th>Individual Assessment</th><th>Group Assessment</th></tr>
<tr><td>1. Class Participation (including 5% “Learning to learn” self-reflection)</td><td>20%</td><td>--</td></tr>
<tr><td>2. Group Project</td><td>--</td><td>30%</td></tr>
<tr><td>3. Term Paper</td><td>50%</td><td>--</td></tr>
<tr><td>4. Online Academic Integrity Tutorial Test</td><td>Compulsory Pass Requirement</td><td></td></tr>
</table>
</td></tr>
</table>

	<table><tr><td>5. Law Abiding-Leadership Test</td><td>Compulsory Pass Requirement</td><td></td></tr></table> • The grade is calculated according to the percentage assigned; • The completion and submission of all component assignments are required for passing the subject; and • Student must pass all component(s) if he/she is to pass the subject.
Objectives	The course is designed to enable students to learn and integrate theories, research and concepts of the basic personal qualities (particularly intrapersonal and interpersonal qualities) of effective leaders. This subject also intends to help students develop and reflect on their intrapersonal qualities, interpersonal qualities and connection of learning to oneself. Finally, the subject cultivates students' appreciation of the importance of intrapersonal and interpersonal qualities in effective leadership.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: a. understand and integrate theories, research and concepts on the basic qualities (particularly intrapersonal and interpersonal qualities) of effective leaders; b. develop self-awareness and self-understanding; c. demonstrate self-leadership in pursuit of continual self-improvement; d. apply intrapersonal and interpersonal skills in daily lives; e. appreciate the importance of intrapersonal and interpersonal qualities in effective leadership, particularly the connection of learning in the subject to one's professional development and personal growth; f. recognize and accept their responsibility as professionals and citizens to the society and the world.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. An overview of the personal attributes of effective leaders: roles of intrapersonal and interpersonal qualities in effective leadership and university graduates' employability in the service economy; **compulsory requirements of the subject**: "Learning to learn" assessment; Online Tutorial on Academic Integrity; law abiding-leadership assessment; group presentation; individual assignment; class participation. 2. Self-leadership in effective leaders: the importance of self-understanding and self-management; "Learning to learn" ability; life-long learning and leadership. 3. Cognitive competence (critical thinking): misinformation, disinformation, and propaganda; different types of thinking styles; critical thinking model; roles of cognitive competence, critical thinking and problem solving in effective leadership; learning to learn. 4. Social emotional competence: social awareness; relationship

	management; the application of social emotional competence in daily lives and in effective leadership. 5. Resilience and stress-coping: concepts and theories of resilience and stress-coping; relationship between resilience, stress and stress-coping; role of resilience in effective leadership; application of resilience and stress-coping on daily basis. 6. Morality and integrity: moral competence; role of morality in effective leadership; ethical leadership; importance of moral competence in different professions, academic integrity in university students (online tutorial on academic integrity). 7. Spirituality: connectedness to others, personal beliefs and values, meaning of life, spirituality and professional development, role of spirituality in effective leadership; spiritual practices in daily lives. 8. Law-abidance as a quality of leadership: basic concepts and theories related to law-abiding leadership and socially responsible leadership; importance of law-abiding leadership and socially responsible leadership to professionals and the general public; basic knowledge on national security and the Hong Kong; Hong Kong National Security Law and the Article 23 legislation and details of the Safeguarding National Security Ordinance; a brief overview of modern Chinese history, the Constitution, and the Basic Law. 9. Cultural competence and global citizenship: cultual competence in a globalized world; global citizenship and effective leadership; responsibilites of university students as both professionals and citizens of the society. 10. Effective communication: basic communication skills; importance of effective communication to daily life and leadership; care and compassion in effective leadership. 11. Team building: theories, concepts, skills and blocks of team building; role of team building in effective leadership; application of team building in different professions and daily lives. **Note:** For the topic on law abidance and the Hong Kong National Security Law, students are required to pass an online assessment with multiple-choice questions. Students can take the assessment with multiple attempts. The assessment does not carry any mark.
Teaching/Learning Methodology *(Note 3)*	Students taking this course are expected to be sensitive to their own behavior in intrapersonal and interpersonal contexts. Intellectual thinking, reflective learning, experiential learning and collaborative learning are emphasized in the course. Case studies on successful and fallen leaders will also be covered in the course. The teaching/learning methodology includes: 1. Lectures (including e-learning modules); 2. Experiential classroom activities; 3. Group project presentation; 4. Written assignment.

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1. Class Participation (including 5% "Learning to learn" self-reflection) ^	20%	✓	✓	✓	✓	✓	✓
2. Group Project*	30%	✓	✓	✓	✓	✓	✓
3. Term Paper^	50%	✓	✓	✓		✓	
4. Academic integrity online module and assessment^	0%	✓			✓	✓	
5. Quiz on law abidance and Hong Kong National Security Law^	0%	✓	✓	✓	✓	✓	✓
Total	100 %						

*assessment is based on group effort
^assessment is based on individual effort

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

1. Assessment of Class Participation (20%): It is expected that both online and classroom activities, and preparation for lectures can help students understand the subject matter and oneself, develop social skills, connect learning to oneself and promote an appreciation of the importance of intrapersonal and interpersonal leadership qualities. Hence, marks for class participation (including the participation in e-learning modules) and preparation for lectures will be given. Students will be assessed by: a) preparation for class (e.g., complete e-learning modules, online assignment, and dig up materials before class), b) participation in class and online learning activities (e.g., completion of worksheets and sharing in class, participation in online discussion forum) and c) volunteering to answer questions and join discussions. Also, students will be invited to rate the performance and learning of other group members in an honest and authentic manner. The marks will reflect the mastery of knowledge, self-reflection and quality of interpersonal skills (such as collaboration with other members and contribution to the group) of the group members.

	Peer assessment will contribute to marks in class participation. As the university strategic priority, "Learning to learn" has the aim to support the development of students' ability to engage in the learning process, manage their own learning, and take their learning to a higher level. "Learning to learn" concept will be covered in the lectures and students are required to develop a personal development plan at the beginning of the course. To encourage students to reflect on their experience in achieving their learning goals set in the development plan, students are required to reflect on their learning to learn ability and related learning experience in a reflective journal (5%). 2. Assessment of Group Project (30%): Group project presentation can give an indication of the students' understanding and integration of theories and concepts on the personal qualities in effective leadership, personal and group reflections, interpersonal skills and degree of recognition of the importance of active pursuit of knowledge covered in the course. 3. Assessment of Term Paper (50%): Individual paper can give an indication of the students' understanding and integration of theories and concepts on the personal qualities in effective leadership, self-assessment, self-reflection, connection of the subject matter to oneself and degree of recognition of the importance of active pursuit of knowledge covered in the course. 4. Quiz on Law Abidance and Hong Kong National Security Law (0%): As universities have the obligation to conduct education on the Constitution, Basic Law and Hong Kong National Security Law, students are required to take a 3-hour face-to-face lecture on law abiding leadership and 7 hours of self-study. Based on the related materials on modern Chinese history, the Constitution, the Basic Law, restoration of Hong Kong to mainland China, national security and the Hong Kong National Security Law, students have to take an assessment with 20 multiple choice questions. Students can pass the assessment if he/she has correct answers on at least 16 questions (multiple attempts allowed). A student will fail in this subject if he/she cannot pass this assessment component. 5. Academic Integrity Online Module and Assessment (0%): As academic integrity is very important for university students, students are required to take an online Academic Integrity program lasting for two hours. First, students are required to take a multiple-choice test with 10 questions in the pre-test without a passing mark (multiple attempts allowed). After that, students need to study four online modules to understand the concepts of academic integrity and ways to avoid academic dishonesty. Finally, students are required to take another multiple-choice test with 20 questions in the post-test with a passing benchmark of 15 questions (multiple attempts allowed). A student will fail in this

	subject if he/she cannot pass this assessment component. They must complete this component by the 5th week of the semester. Based on the implementation of this subject in the past ten academic years (2012-2022), evaluation findings consistently showed that this subject was able to achieve the intended learning outcomes in the students. The positive evaluation findings are documented as follows: Leung, H. (2016). Levels of reflection on teaching a leadership and positive youth development subject. *International Journal on Disability and* Human *Development, 15*(2)*,* 211-220. Leung, H., Shek, D. T. L., & Mok, B. P. W. (2016). Post-lecture subjective outcome evaluation of a university subject on leadership and intrapersonal development. *International Journal of Child and Adolescence Health, 9*(2)*,* 223-234. Li, X., & Shek, D. T. L. (2020). Objective outcome evaluation of a leadership course utilising the positive youth development approach in Hong Kong. *Assessment & Evaluation in Higher Education, 45*(5), 741-757. Ma, C. M. S., Shek, D. T. L., & Li, P. P. K. (2017). Evaluation of a leadership and intrapersonal development subject for university students: Experience in Hong Kong. *International Journal of Child and Adolescent Health, 10*(3), 337-346. Ma, C. M. S., Shek, D. T. L., Li, P. P. K., Mok, B. P. W. & Leung, E. Y. K. (2016). Qualitative evaluation of a leadership and intrapersonal development subject for university students in Hong Kong. *International Journal of Child and Adolescent Health, 9*(2), 217-224. Shek, D. T. L. (2012). Development of a positive youth development subject in a university context in Hong Kong. *International Journal on Disability and Human Development, 11*(3), 173-179. Shek, D. T. L. (2013). Promotion of holistic development in university students: A credit-bearing subject on leadership and intrapersonal development. *Best Practices in Mental Health, 9*(1), 47-61. Shek, D. T. L., Fok, H. K., Leung, C. T. L., & Li, P. P. K. (2016). Qualitative evaluation of a credit-bearing leadership subject in Hong Kong. *International Journal of Child and Adolescent Health, 9*(2), 173-183. Shek, D. T. L., & Leung, J. T. Y. (2014) Perceived benefits of a university subject on leadership and intrapersonal development. *International Journal on Disability and Human Development. 13*(4), 481-488. Shek, D. T. L., & Ma, C. M. S. (2014). Do university students change after taking a subject on leadership and intrapersonal

<table>
<tr><td></td><td colspan="2">development? International Journal on Disability and Human Development, 13(4), 451-456.

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

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Yu. L., Shek, D. T. L., & Leung, E. Y. K. (2016). Post-lecture evaluation of a university subject on leadership and intrapersonal development. International Journal of Child and Adolescent Health, 9(2), 155-164.</td></tr>
<tr><td rowspan="2">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures and experiential/online learning activities</td><td>39 Hrs.</td></tr>
</table>

	Other student study effort:	
	▪ Group project preparation	20 Hrs.
	▪ Reading and writing term paper	61 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	**Basic References** Catalano, R. F., Berglund, M. L., Ryan, J. A. M., Lonczak, H. S., & Hawkins, J. D. (2002). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Prevention and Treatment, 5*(15), 1-106. Dalton, J., & Crosby, P. (2007). Being and having: Shouldn't excellence in higher education (and people) be a measure of what one does rather than what one has? *Journal of College and Character, 9*(1), 1-5. Davies, L. (2006). Global citizenship: abstraction or framework for action? Educational Review, *58*(1), 5-25. Dugan, J. P. (2006). Involvement and leadership: A descriptive analysis of socially responsible leadership. *Journal of College Student Development*, *47*(3), 335-343. Dugan, J. P. (2015). The measurement of socially responsible leadership: Considerations in establishing psychometric rigor. Journal of Educational, Cultural and Psychological Studies, *12*, 23-42. Hong Kong Government. (2020, July 7). The Law of the People's Republic of China on Safeguarding National Security in the Hong Kong Special Administrative Region. Available at https://www.isd.gov.hk/nationalsecurity/eng/pdf/NSL_QnA_Book.pdf. Gilley, A., Gilley, J. W., McConnell, C. W., & Veliquette. A. (2010). The competencies used by effective managers to build teams: An empirical study. *Advances in Developing Human Resources, 12*(1), 29-45. Goleman, D. (1995). *Emotional Intelligence: Why it can matter more than IQ.* New York: Bantam Books. Houghton, J. D., & Yoho, S. K. (2005). Toward a contingency model of leadership and psychological empowerment: When should self-leadership be encouraged? *Journal of Leadership and Organizational Studies, 11*(4), 65-84. Kim, Y. H., Chiu, C. Y., & Zou, Z. M. (2010). Know thyself: Misperceptions of actual performance undermine achievement motivation, future performance, and subjective well-being. *Journal of Personality and Social Psychology*, *99*(3), 395-409. Kohlberg, L. (1964). Development of moral character and moral ideology. In M. L. Hoffman, & L. W. Hoffman (Eds.), *Review of Child Development Research* (pp. 381-431). New York: Russell Sage Foundation. Lau, P. S. Y., & Wu, F. K. Y. (2012). Emotional competence as a positive youth development construct: A conceptual review. *The Scientific World Journal, 2012*, 8 pages. doi:10.1100/2012/975189	

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

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	holistic development of university students in Hong Kong. [Special issue]. *International Journal of Child and Adolescent Health, 12*(1), 1-122. Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, *6*(1), 111-135.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Intended Blank

Major - Core Subjects

Subject Description Form

Subject Code	AAE2003
Subject Title	Introduction to Aircraft Systems
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To develop students' knowledge and skill in the operation and design of essential mechanical and electrical systems in transport aircrafts.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the configurations and operating principles of essential aircraft systems; and b. Apply basic engineering skills to draft preliminary designs of essential aircraft systems.
Subject Synopsis/ Indicative Syllabus	**Aircraft Control Systems** – Principles of flight control, flight control surfaces (primary and secondary flight control), including ailerons, elevators, rudders, high lift devices, trim tabs, etc., flight control linkage systems, artificial feel systems, flight control actuation, etc. **Landing Gear Systems** – Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tires; Steering; Air-ground sensing. **Engine Systems** – Principles of different types of engines, including turbojet, turbofan, turboshaft and turbo-prop engines; Engine coating structures; Engine constructions, including types and basic performance of Inlet, compressors, combustion section, turbine section and exhaust; Engine operation procedures; Engine performance. **Fuel Systems** – Characteristics of aircraft fuel systems; Aviation fuel; Fuel system components. Aircraft mass and payload. System lay-out; Fuel tanks; Supply systems; Fuel system operation modes. **Hydraulic Systems** – Hydrostatics; Flight control and utility functions, including emergency power sources, landing-gear system, braking and anti-skid; Hydraulic system components, including actuator, reservoir, piping, valve, pumps, filters; Hydraulic fluids; Power distribution. **Electrical Systems** – Characteristics of civil aircraft electrical system; Electrical load; power generation, including batteries, AC and DC power generations, emergency power generation; Power generation control, Inverters, transformers and rectifiers; Power distribution; Circuit protection; External / Ground power. **Atmospheric Condition** – Properties of air; The Earth's atmosphere; Definitions of different altitudes; Standard atmosphere; Atmospheric wind and turbulence.

Pneumatic Systems – Pneumatic system and components, including air supply, pressure regulation, air control, actuators; Pneumatic system used as actuators; Bleed air system, e.g., operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services; Pitot-static systems.

Environmental Control Systems – The need for cabin and equipment conditioning; Air conditioning system, including heating, cooling, humidity control; Air cycle and vapour cycle machines; Pressurization systems; Cabin noise; Anti-g system; Anti-icing, de-icing, rain dispersal, demisting systems;

Emergency system – Warning systems; Fire and smoke detection and warning systems; Emergency power source; Explosion suppression; Emergency oxygen; Passenger evacuation and crew escape; Crash recorder; Emergency landing.

Propeller – Fundamentals of Blade element theory. High / low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance; Speed control and pitch change methods.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aircraft systems.

Teaching / Learning Methodology	Intended subject learning outcomes to be covered	
	a	b
1. Lectures	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed	
		a	b
1. Attendance	5%	✓	✓
2. Assignment	15%	✓	
3. Mid-term test	15%	✓	
4. Course project	15%	✓	✓
5. Final 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 final examination is adopted to assess students on their overall understanding of the concepts and their ability in applying the concepts. The continuous assessment consists of assignment, test and group project is aimed at enhancing students' comprehension and assimilation of various topics of the syllabus.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	36 Hrs.
	Other student study effort:	
	▪ Week 7 reading week	3 Hrs
	▪ Self-study	30 Hrs.
	▪ Continuous assessments	39 Hrs.
	Total student study effort	108 Hrs.
Reading List and References	I. Moir and A.G. Seabridge, Design and Development of Aircraft Systems AIAA, 2020. I. Moir and A.G. Seabridge, Aircraft Systems: Mechanical, Electrical, and Avionics Subsystems Integration, 3rd edition, Wiley, 2011. J. Anderson, Introduction to Flight, 9th edition, McGraw Hill, 2021.	

Revised in May 2025

Subject Description Form

Subject Code	AAE2004
Subject Title	Introduction to Aviation System and Air Transport Regulation
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with 1. An overview of air transport operations and aviation system to a diverse audience that has an interest in the development of careers in aviation; 2. The knowledge of regulation and the responsibility of official bodies in fostering civil aviation safety and operations; and 3. Up-to-date operational concepts and practices in aviation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify and explain mandatory airworthiness requirements; b. Describe the aviation environmental impact and published mitigating measures; and c. Explain the roles of the International Civil Aviation Organisation and the International Air Transport Association in fostering safe and efficient air transport.
Subject Synopsis/ Indicative Syllabus	**Airline Organisation –** Air Operator's Certificate; Route planning. Airline operations; Flight operations; Aviation security training. **Airport Operations** – Overview of airport planning and operations; Passenger and cargo terminal operations; Maintenance of electrical, mechanical, and electronic systems: Safety management on airport operations. Operations and development of airport facilities; Role of air traffic controls; Aviation security and runway system design; Take-off and landing separation minima; Reduced vertical separation minima. **Aviation and the Environment** – Environmental impacts of aviation; aircraft emissions and noise; HK CAD noise abatement departure and noise mitigating measures. **International Associations** – International Civil Aviation Organisation (ICAO); Airport Council International (ACI); International Air Transport Association (IATA).

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation systems (outcomes a to c).

Case studies are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to c).

Projects are used to help students to deepen their knowledge on a specific topic through search of information, analysis of data and report writing (outcomes a to c).

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Case studies	✓	✓	✓
3. Project	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments	20%	✓	✓	✓
2. Class participation	10%	✓	✓	✓
3. Group Project	30%	✓	✓	✓
4. Examination	40%	✓	✓	✓
Total	100%			

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

Overall Assessment:

0.40 × End of Subject Examination + 0.60 × 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 group project. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. A group project is used to assess the students' capacities of self-learning and problem-solving and effective communication skills in English to fulfil the requirements of working in the aviation industry.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Project	39 Hrs.
	Other student study effort:	
	▪ Course work	39 Hrs.
	▪ Self-study	39 Hrs.
	Total student study effort	117 Hrs.
Reading List and References	1. Richard De Neufville. Airport Systems: Planning, Design, and Management, McGraw-Hill, latest edition. 2. HK Government. Air Navigation (Hong Kong) Order, latest amendment. 3. HK CAD. Aeronautical Information Publication, latest update.	

Jun 2024

Subject Description Form

Subject Code	AAE2005
Subject Title	Electrics and Electronic for Aeronautical Engineering
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with 1. The fundamental knowledge of electrics and electronics in aeronautical engineering; 2. Basic electrical and electronic devices on aircraft; and 3. Design and development of basic electronic device.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the fundamental concepts of electrical circuits in aeronautical engineering; b. Understand the principle of basic electric devices in aeronautical engineering; c. Apply the appropriate techniques to solve problems in electrical circuits; and d. Design basic electronic devices with the basic knowledge.
Subject Synopsis/ Indicative Syllabus	**Basic law:** Circuit elements; Kirchhoff's Current Law (KCL); Kirchhoff's Voltage Law (KVL); Ohm's Law; series and parallel circuits **Semiconductor:** Intrinsic semiconductor, p-type semiconductor, n-type semiconductor. **Diode and circuits :** Formation of PN junction, the working principle of diode and its basic circuits. **Transistor and circuits:** the current amplification effect of BJT; carrier motion analysis in BJT. **Logical operation and circuits:** basic logic operation and devices, Combinational logic operation and circuits, Sequential logic operation and circuits **Other basic electronic circuits:** Filter, ADC, Decoder, Counter and etc.

Teaching/Learning Methodology

The key concepts and techniques covered in this subject are discussed in lectures and tutorials. The lectures emphasise on fundamental understanding and practical problem-solving techniques. To strengthen understanding of fundamental knowledge of electrics and electronic in the field of aeronautical engineering, students have the chances to conduct hands-on exercises in both lectures and tutorials. Furthermore, individual assignments or tests consisting of essays and the numerical problems are involved to allow students recognise their level of understanding and create evidence of learning.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	
2. Tutorial	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	Weighting %	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment	20%	√	√	√	√
2. Lab	20%	√	√	√	√
3. Case study presentation	20%	√	√	√	√
4. Examination	40%	√	√	√	√
Total	100%				

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

Overall assessment:

0.6 x continuous assessment + 0.4 x examination

Assignment, lab and case study presentation are used to make up the continuous assessment and the final examination is included to evaluate and assess the students' learning outcomes in this course. The continuous assessment and the final exam are conducted at different times in the semester to consolidate students' knowledge in lectures and tutorials. They are appropriate in assessing intended learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Literature Review and Self-learning	46 Hrs.
	▪ Assignments	26 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	1. Giorgio Rizzoni, "Fundamentals of Electrical Engineering", New York: McGraw- Hill, 2009. 2. Giorgio Rizzoni, James Kearns, "Principles and Applications of Electrical Engineering" 6th Edition, Boston: McGraw-Hill Higher Education, 2018. 3. "E Electrics and Electronics. ATPL Ground Training Series", CAE Oxford Aviation Academy.	

Jun 2024

Subject Description Form

Subject Code	AAE3001
Subject Title	Fundamentals of Aerodynamics
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AMA2111 Mathematics I **OR** AMA2112 Mathematics II
Objectives	This subject will provide students with 1. To develop students' knowledge in the fundamentals of aerodynamics; and 2. To provide student's insight on airflow characteristics flowing through the aircraft; and 3. To develop the students' capability in designing aerofoil with the consideration of different wind factors.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify, formulate and solve problems in aviation engineering by applying knowledge of fundamentals of aerodynamics (including aerodynamics primarily in inviscid flow); and b. Use the techniques, skills and modern computational and information technology necessary to analyse aerodynamics, lift and drag on simple geometries and thin airfoils.
Subject Synopsis/ Indicative Syllabus	**Introduction to Aerodynamics** - Aerodynamic variables, forces and moments. **Fundamental Principles and Equations** - Control volumes and fluid elements; Substantial derivative; Reynolds transport theorem; Continuity equation; Momentum equation; Energy equation; Euler's equation. **Dimensional Analysis** - Buckingham Pi theorem; Flow similarity; Dimensionless numbers: Mach, Reynolds, Prandtl, and Froude numbers. **Inviscid, Incompressible Flow** - Bernoulli equation; Flow in a duct – Venturi and low- speed wind tunnel; Pitot tube measurement of airspeed; Irrotational flow; Circulation; Stream function and velocity potential; Laplace equation and elementary solutions – uniform flow, source, sink, doublet, non-lifting and lifting flow over cylinder, vortex flow; Kutta-Joukowski theorem on circulation and lift. **Incompressible Flow over Airfoils** - Airfoil nomenclature and characteristics; Kutta condition; Circulation and lift; Kelvin's circulation theorem and starting vortex; Thin airfoil theory; Viscous airfoil drag. **Incompressible Flow over Finite Wings** - Downwash and induced drag; Vortex system on finite wing; Laws on vortex motion; Prandtl's lifting-line theory. **Inviscid, Compressible Flow** - Normal shock relations; Area-velocity relation; Oblique shock relations; Prandtl-Meyer expansion waves; Linearised flow; Prandtl-Glauert rule; Critical Mach number; Supercritical airfoil.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, projects, tutorials, and homework assignments.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for aerodynamics.
3. Technical/practical examples and problems are raised and discussed in class.
4. Experiments or projects are used to evaluate the lift and drag of streamline objects and airfoils.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered	
	a	b
1. Lectures	✓	✓
2. Projects	✓	✓
3. Tutorials	✓	✓
4. Homework assignments	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed	
		a	b
1. Tests	20%	✓	✓
2. Projects	30%	✓	✓
3. 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

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

Student Study Effort Expected	Class contact:	
	▪ Lectures	33 Hrs.
	▪ Tutorials	6 Hrs.
	Other student study effort:	
	▪ Self-study	67 Hrs.
	Total student study effort	**106 Hrs.**
Reading List and References	1. Munson, B.R, Young, D. F., Okiishi, T. H., Huebsch, W. W., Fundamentals of Fluid Mechanics, John Wiley & Sons, 7th edition, 2012. 2. Anderson, J. D., Fundamentals of Aerodynamics, McGraw-Hill, 6th edition, 2016. 3. Bertin, J. J., Cummings, R. M., Aerodynamics for Engineers. Pearson, 6th edition, 2013.	

Revised in June 2022

Subject Description Form

Subject Code	AAE3002
Subject Title	Aircraft Structures and Materials
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	**Pre-requisite:** ENG2001 Fundamentals of Materials Science and Engineering **AND** ME23001 Engineering Mechanics
Objectives	1. To provide students with the key knowledge relevant to aircraft structures and materials; and 2. To provide students with an overview of the composite materials used in modern aircraft; and 3. To provide students with the numerical methods for formulating and solving engineering problems related to aircraft structures and materials.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate a good understanding of the key aspects of aircraft structures; and b. Comprehend the characteristics of the various materials used in aircrafts; and c. Analyze and assess aircraft structures subject to various types of loading using stress analysis methods and failure criteria; and d. Understand the mechanical behaviors of the composite materials used in aircrafts.
Subject Synopsis/ Indicative Syllabus	**Characteristics of Aircraft Structures –** Aircraft structural elements. Wing, fuselage, tail and landing gear. Riveting, fastener and adhesive joint. **Aircraft Structural Analysis** – Typical loadings applied on aircrafts. Bending, shear, torsion of thin-wall structures. Structural idealization. Practical stress analysis of wings and fuselages under combined loading. **Fundamentals of Aircraft Materials –** Material fundamentals. Metallic alloys and their heat treatment. Composites. **Failure Criteria for Isotropic Materials –** Strength criteria for brittle materials. Yield criteria for ductile materials. Stress concentration. Fatigue. Fracture. Stability of beams under transverse and axial loads. **Fundamentals of Aircraft Composites –** Mechanical behaviors of composite materials. Processing and fabrication techniques for aircraft composites.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to aircraft structures and materials (outcomes a to d).

Teaching / Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lectures	✓	✓	✓	✓
2. Tutorials	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be covered			
		a	b	c	d
1. Final examination	60%	✓	✓	✓	✓
2. Take-home assignments and/or in-class quizzes	40%	✓	✓	✓	✓
Total	100%				

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

Overall Assessment:

0.6 × End of Subject Examination + 0.4 × Continuous Assessment

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

Student Study Effort Expected

Class contact:	
▪ Lecture	26 Hrs.
▪ Tutorials	13 Hrs.
Other student study effort:	
▪ Self-study	39 Hrs.
▪ Assessment preparation	39 Hrs.
Total student study effort	**117 Hrs.**

Reading List and References	1. C.T. Sun, Mechanics of Aircraft Structures, John Wiley & Sons, latest edition. 2. T.H.G. Megson, Aircraft Structures for Engineering Students, Elsevier, latest edition. 3. R.F. Gibson, Principles of Composite Material Mechanics, McGraw-Hill International Editions, latest edition.

Jun 2024

Subject Description Form

Subject Code	AAE3003
Subject Title	Aircraft Propulsion Systems
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge of advanced modern aircraft gas turbine engines
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Possess a deep theoretical understanding of state-of-the-art propulsion systems, including underlying mechanical engineering principles and relevant aircraft gas turbine engines; b. Effectively apply knowledge, skills, and hands-on experience to investigate and analyze the key properties of propulsion systems in various engineering contexts. c. Function professionally in multidisciplinary teams (including the knowledge of aviation engineering to different situation of engineering context and professional practices in propulsions systems).
Subject Synopsis/ Indicative Syllabus	**Introduction to propulsion –** Brief history of propulsion, aircraft piston engine, propeller, turbojet engine, aircraft gas turbine engines (turbojet, turbofan, turboprop, turboshaft), performance parameters of turbofan engines, other air-breathing engines, rockets **Thermodynamics –** System and its properties, measurement diagnostics, first law of thermodynamics, forms of work and heat interactions, ideal gas law, internal energy, enthalpy, specific heat capacities, mass conservation and momentum conservation for steady flow process, the second law of thermodynamics, entropy, heat engines, gas power cycles (Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle). **Compressible flows –** Speed of sound, Mach number, stagnation properties, critical properties, nozzle flow, shock waves, measurement diagnostics and flow visualization **Aircraft engine subsystems –** Nacelle, inlet, nozzle, fan, compressor, turbine, combustor, afterburner, fluid system (air, oil, and fuel), control system, engine test and maintenance, engine start. **Engine performance parameters, parametric cycle analysis, and component performance -** turbojet, turbojet with afterburner, turbofan, turboprop, and turbo-shaft engines.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, homework assignments, lab reports, and a final examination.
2. The continuous assessment and examination are aimed at providing students with the integrated knowledge required for propulsion systems.
3. Technical/practical examples and problems are raised and discussed in class.
4. Experiments projects are designed to evaluate the propulsion system.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lectures	✓	✓	✓
2. Homework assignments	✓	✓	✓
3. Experiments/Projects	✓	✓	✓
4. Final exam	✓	✓	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Lab session	30%		✓	✓
2. Homework assignments	20%	✓		✓
3. 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 homework assignments and lab reports. 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 learned.

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	30 Hrs.
	▪ Lab	6 Hrs.
	Other student study effort:	
	▪ Week 7 reading week	3 Hrs.
	▪ Self-study	39 Hrs.
	▪ Lab preparation and homework assignment	39 Hrs.
	Total student study effort	**117 Hrs.**
Reading List and References	1. Thermodynamics: An Engineering Approach, 8th Edition, 2014, by Yunus A. Cengel and Michael A. Boles. McGraw-Hill Education 2. Fluid Mechanics: Fundamentals and Applications, 4th Edition, 2018. Cengel, Y. & Cimbala, J., McGraw-Hill Education 3. Elements of Propulsion: Gas Turbine and Rockets, 2nd Edition, 2016. Mattingly, J. AIAA. 4. The Jet Engine, 5th Edition, 2015, Rolls Royce, Wiley 5. Aircraft Propulsion and Gas Turbine Engines, 2nd Edition, 2017, El-Sayed, A. F.	

May 2025

Subject Description Form

Subject Code	AAE3004
Subject Title	Dynamical Systems and Control
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AMA2111 Mathematics I **OR** AMA2112 Mathematics II
Objectives	1. To introduce basic concepts and methods of feedback control and automatic control systems; 2. To introduce mathematical modeling of physical elements in dynamic systems; 3. To provide basic understanding of behaviour of first- and second-order systems due to typical inputs, and concepts of time-domain specifications; 4. To introduce basic concepts of frequency response and frequency domain specifications; 5. To introduce feedback control and its application to improve the overall system behaviour; and 6. To present the basic concepts of proportional-and-integral-and-derivative control, and the setting of control parameters to meet the system goals.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify, formulate and solve problems in aviation engineering by applying knowledge of dynamical systems and control (including transfer function and response of a first- or second-order system both in time and frequency domains); b. Design and conduct experiments, as well as analyze how the system dynamic behavior is related to system specifications and its improvements according to the specifications (including Routh-Hurwitz stability criterion); and c. Have knowledge of contemporary issues of dynamical system and control (including applications of proportional, integral and derivative feedbacks in control systems) to understand the impact of engineering solutions in a global and societal context.
Subject Synopsis/ Indicative Syllabus	**Dynamic Responses of First-Order and Second-Order Systems -** Mathematical modeling of dynamic systems (elements or interconnection of elements) by differential equations, critical parameters of first-order and second-order systems, system response analysis due to step, ramp and impulse inputs using Laplace transform. **Frequency Response of First-Order and Second-Order Systems -** Harmonic response, root locus, Bode diagrams, frequency domain specifications, frequency response applications, Nyquist criterion and Nyquist plots. **Fundamental Methods of Feedback Control -** Analysis of open-loop and closed-loop systems, transfer functions, block diagrams, time-domain specifications, time-domain analysis of control systems, system stability, Routh-Hurwitz stability criterion. **Basic Feedback Controller-** Automatic controllers, P, PD, PID controllers, Steady

	state error.
Teaching/Learning Methodology	The teaching and learning methods include lectures, tutorials, lab sessions, and reading sections. The lectures aim at providing students with an integrated knowledge required for understanding and analyzing dynamic systems and fundamental feedback control. The tutorials aim to enhance students' analytical skills. Examples on system modelling, dynamic response of linear systems, and performance and stability of control systems will be involved. Students will be able to solve real-world problems. The lab sessions involve applying the knowledge acquired in class to solve real-world problems by designing feedback control systems. The lab sessions also train students in the analysis and presentation of experimental data.

Teaching/Learning Methodology	Intended subject learning outcomes to be cover		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓
3. Laboratory	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignment	20%	✓	✓	✓
2. Mid-term test	10%	✓	✓	
3. Lab report	20%	✓	✓	✓
4. Examination	50%	✓	✓	
Total	100%			

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

Overall Assessment:

0.50 x Examination + 0.50 x Continuous Assessment

Assessment:

Assignment, lab report and mid-term test are used in continuous assessment to provide students with timely feedback and help them understand course materials as they progress. The final examination is used to evaluate students' overall

	understanding of the course and their ability to apply the knowledge they have acquired.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Lab	6 Hrs.
	Other student study effort:	
	▪ Week 7 Reading week	3 Hrs.
	▪ Self-study	45 Hrs.
	▪ Assignment	21 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. K. Ogata, Modern Control Engineering, Prentice Hall, latest edition. 2. N.S. Nise, Control Systems Engineering, John Wiley, latest edition.	

May 2025

Subject Description Form

Subject Code	AAE3006
Subject Title	Safety, Reliability and Compliance
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students to 1. Gain fundamental knowledge of aviation safety and compliance; and 2. Develop students' understanding of methods and techniques used in evaluating the safety, reliability and compliance of aviation operations and services.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Work professionally in aviation systems and understand aircraft regulations (including the understanding of the safety, quality and reliability provisions and infrastructure in aviation administration and service providers and the mathematical concepts used in reliability and safety analysis of aviation); b. Function professionally in multidisciplinary teams (including the assessment processes for compliance to certificates in aviation trade); and c. Understand professional and ethical responsibility (including the identification of major cases of aviation errors and violations).
Subject Synopsis/ Indicative Syllabus	**Introduction -** Safety. Product and Service Quality. Reliability. Assurance. Compliance. Total Care: Airlines; airports, air traffic control, MRO, OEM and stakeholders. **Aviation Errors and violations -** Accident and incident investigation models; Maintenance error decision models; Root cause analysis. **Certification and Compliance -** Roles of aviation authorities and administrations. Important certificates and specifications in aviation industry. Documentation and Implementation. Auditing. Non-Compliance and Follow up. **Reliability Concepts and applications -** Failures. Failure rate. MTBF. Reliability distributions. Series and parallel redundancy. Imperfect maintenance. Reliability assessment. Failure prevention tools. **Performance Measurement -** Safety Management System. Hazard analysis and control. Performance indicators. Statistical control techniques. Safety Culture.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation system safety and reliability (outcomes a to c).

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

Group mini-projects are used to help students to deepen their knowledge on a specific topic through search of information, analysis of data and report writing (outcomes a to c).

Special seminar(s) delivered by invited industrial professionals may be used to relate the concepts learnt in class to engineering practices. Students are expected to achieve better understanding of aviation safety through this activity (outcomes a and c).

Teaching/Learning Methodology	Intended subject learning outcomes to be cover		
	a	b	c
1. Lectures	✓	✓	✓
2. Tutorials	✓	✓	✓
3. Mini-project	✓	✓	✓
4. Special seminar	✓		✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments	15%		✓	✓
2. Group mini-project	15%	✓	✓	✓
3. Tests	10%	✓	✓	✓
4. Examinations	60%	✓	✓	✓
Total	100 %			

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

Overall Assessment:

0.6 × End of Subject Examination + 0.4 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by seminars and continuous assessment including assignments, group mini-project, and tests. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. In particular, group mini-project is used to assess the students' capacities of self-learning and problem-solving and effective communication skill in English so as to fulfill the requirements of working in the aviation industry.

Student Study Effort Expected	Class contact:	
	▪ Lecture	27 Hrs.
	▪ Tutorial	9 Hrs.
	Other student study effort:	
	▪ Reading week	3 Hrs.
	▪ Course work	25 Hrs.
	▪ Self-study	46 Hrs.
	Total student study effort	110 Hrs.
Reading List and References	1. Redrigues, C.C. and Cusick, S.K., Commercial Aviation Safety, McGraw Hill, latest edition. 2. Ferguson, M. and Nelson, S., Aviation Safety: a balanced industry approach, Delmar Cengage Learning, latest edition. 3. Reason, J. and Hobbs, A., Managing Maintenance Error, Ashgate, latest edition. 4. O'Connor, P.D.T., Practical Reliability Engineering, Wiley, latest edition. 5. International Journal of Reliability, Quality and Safety Engineering.	

May 2025

Subject Description Form

Subject Code	AAE3008
Subject Title	Fundamental Thermal-fluid Science
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AP10005 Physics I **and** AMA2111 Mathematics I
Objectives	1. To provide students with basic knowledge of thermodynamics and fluid mechanics. 2. To develop students' capability of analysing thermal-fluid problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate and solve thermal-fluid problems by applying knowledge of thermodynamics and fluid mechanics; b. Analyse and interpret numerical and experimental thermal-fluid predictions and observations; and c. Acquire a basic understanding of the state-of-the-art of this field.
Subject Synopsis/ Indicative Syllabus	**Fundamentals of thermodynamics –** Basic concepts, including systems, state, processes, equilibrium, thermodynamic cycle; equation of state; First law of thermodynamics, application to closed system; Second law of thermodynamics, concepts of heat engine, refrigerator; Reversible and irreversible systems; Entropy; Entropy of substance. **Heat transfer mechanisms –** Heat conduction; Convection; Boundary-layer flow; Thermal radiation; Radiative properties; Thermal resistance of parallel walls and cylindrical walls. **Kinematic of fluid motion –** Properties of fluids; Streamlines, streaklines, and pathlines; Eulerian and Lagrangian descriptions; Material derivative; Reynolds transport theorem; Velocity, vorticity, and strain. **Control volume analysis –** Mass conservation; Momentum analysis; Energy analysis. **Fluid governing equations –** Continuity equation, stream function; Momentum equations, stress tensor, constitutive equations, Navier-Stokes equations, Euler equations; Energy equation. **Fluid Statics –** Fluid pressure; Pascal's law and pressure-height relation; Hydrostatic forces on submerged objects; Buoyancy. **Fluid dynamics analysis –** Bernoulli's equation; Potential flow, elementary solutions, flow around cylinder, Kutta-Joukowski theorem; Couette flow; **Pipe flows –** Pipe flow characteristics; Viscosity; Reynolds number; Poiseuille flow; Friction factor; Minor loss.

	External flows – Lift and drag; drag classification, bluff body and streamlined body; boundary layer; flow separation; Drag of flow passing flat plate; Drag of flow around cylinder. **Forced heat convection –** Nusselt number; Thermal boundary layer, Prandtl number; Force heat convection characteristics for flow passing flat plates, cylinders and spheres; Thermal analysis in circular pipes.

Teaching/Learning Methodology

Teaching is conducted through class lectures and tutorials. They are aimed at providing students with integrated knowledge required for thermal-fluid applications.

Technical/scientific examples and problems are raised and discussed in lecture and tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Attendance	5%	✓	✓	✓
2. Assignment	25%	✓	✓	✓
3. Test	15%	✓	✓	
4. Examination	60%	✓	✓	
Total	100%			

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

Overall Assessment:

0.60 × End of Subject Examination + 0.40 × Continuous Assessment

The continuous assessment consists of homework assignment 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 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	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	33 Hrs.
	▪ Homework assignment	50 Hrs.
	Total student study effort	122 Hrs.
Reading List and References	1. Cengel Y. A., Cimbala J. M., and Turner R. H., Fundamentals of Thermal-Fluid Sciences. McGraw-Hill, 5th edition. 2. White F. M., Viscous Fluid Flow. McGraw-Hill, 3rd edition. 3. Cengel Y. A. and Ghajar A. J., Heat and Mass Transfer: Fundamentals and Applications. McGraw-Hill, 6th edition.	

May 2025

Subject Description Form

Subject Code	AAE3009
Subject Title	Operations Research and Computational Analytics in Air Transport Operations
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE2004 Introduction to Aviation System and Air Transport Regulation
Objectives	This subject will provide students with 1. The theory, techniques of operations research, convex optimisation, resource planning and capacity constraints modelling in aviation; 2. The knowledge to solve the operations research problem using commercial solvers; and 3. The ability to analyse numerical results to produce sensible and actionable insight and strategies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design mathematical models for air transport operation problems; b. Obtain the solution via commercial solver with appropriate heuristics and algorithms; c. Illustrate, interpret, and analyse the numerical results and generate solutions and suggestions; and d. Determine the global/local optimal solutions and compare the alternatives for air transport operation problems.
Subject Synopsis/ Indicative Syllabus	**Convexity** – affine and convex sets; hyperplanes; convex functions and its properties; conjugate function, quasiconvex functions, log-concave and log-convex functions; convexity with respect to generalised inequalities. **Linear programming and convex optimisation problem** – Basic properties of linear programme; fundamental theorem of linear programming; simplex method; duality and the duality theorem; sensitivity and complementary slackness. **Constrained minimisation/maximisation** – hyperplanes; extreme points; primal methods, dual and cutting plane methods; primal-dual methods. **Air transport operations and its application** – Convex optimisation and optimisation methods in aviation engineering problems; critical path method and resource planning in air transport operations; air logistics transportation problem and optimisation; exact methods, heuristics; and computational analytics methods and the applications in air transport engineering.

Teaching/Learning Methodology

Teaching is conducted through class lectures and laboratory. The basic knowledge, research methodology and theoretical models will be introduced. The understanding of how to address and formulate problems by using mathematical programming, operations research (OR) and optimisation algorithms techniques with modern programming language is emphasised. Research methodology, data analytics skills, algorithm design skills and programme methods are taught in class as well as the related real-life scenarios.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Laboratory	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment / laboratory report	30%	✓	✓	✓	✓
2. Test	20%	✓	✓	✓	✓
3. Final 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 (50%), consists of assignment, laboratory report and test, is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. The final examination assessment (50%) will also be considered to assess the students learning outcome.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Self-study / preparation	36 Hrs.
	▪ Assignments	36 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	1. Boyd, S., Boyd, S. P., & Vandenberghe, L. (2004). Convex optimization. Cambridge university press. 2. Hillier, F. S. (2012). Introduction to operations research. Tata McGraw-Hill Education. 3. Leon, S. J., Bica, I., & Hohn, T. (1998). Linear algebra with applications (Vol. 6). Upper Saddle River, NJ: Prentice Hall. 4. Michael, L. P. (2018). Scheduling: theory, algorithms, and systems. Springer.	

December 2021

Subject Description Form

Subject Code	AAE3010
Subject Title	Airline Operations
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE2004 Introduction to Aviation System and Air Transport Regulation
Objectives	This subject will provide students with 1. The understanding of political, economic, and operational principles and regulations of airline operations; 2. The ability of problem formulation and mathematical modelling for airline operations; and 3. The concept and management style in achieving organisational and operations efficiency in the airline business;
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate mathematical models and deduce their solutions to airline operations related problems; b. Design and validate proper solutions and alternatives in fostering airline business and operations efficiency; c. Design and suggest solutions to ICAO requirements related to cabin safety, cabin crew, pilot flight time limitations, fleet operations and maintenance requirements; and d. Determine airline solutions contributing to the passengers, organisational, societal, economic, and global environment factors.
Subject Synopsis/ Indicative Syllabus	**Airline business environment** – Policy and regulations in the airline business, market structure and competition; benefits and environmental impacts of air transport; characteristics and risks in the airline industry. **Airline financial management** – Airline pricing and revenue management; airport slot coordination, policy, and regulation; aircraft leasing and financial operations. **Airline operations and management** – Airline demand forecasting and analyses, Airline fleet management, airline route planning, Airline competitions and market analyses; regulations in airline operation; Airline ground service management; Human resource management: crew pairing, and rostering management.

Teaching/Learning Methodology

Teaching is conducted through class lectures and projects. The basic knowledge, research methodology and theoretical models will be introduced.

The understanding of how to address and formulate problems by using mathematical modelling and operations research is emphasised. Research methodology, case studies, and data analytics skills are taught in class as well as the related real-life scenarios using data to enhance their research abilities.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Project	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment	20%	✓	✓	✓	
2. Group project	30%		✓	✓	✓
3. Final 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 (50%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via several assignments and group projects. The final examination assessment (50%) will also be considered to assess the students' learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Project	36 Hrs.
	Other student study effort:	
	▪ Week 7 reading week	3 Hrs.
	▪ Self-study / preparation	39 Hrs.
	▪ Case study, assignment and group project	39 Hrs.
	Total student study effort	117 Hrs.
Reading List and References	1. Abdelghany, A., & Abdelghany, K. (2016). Modeling applications in the airline industry. Routledge. 2. Bazargan, M. (2016). Airline operations and scheduling. Routledge. 3. Clark, P. (2017). Buying the big jets: fleet planning for airlines. Taylor & Francis. 4. Wu, C.-L. (2016). Airline operations and delay management: insights from airline economics, networks and strategic schedule planning: Routledge.	

May 2025

Subject Description Form

Subject Code	AAE3011
Subject Title	Aircraft Performance and Flight Management
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AMA2112 Mathematics II
Objectives	To teach students fundamental aerodynamic principles and performance analysis for the management of aircraft flight in atmosphere.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design systems, components, or processes to meet desired needs including the aircraft wing aerodynamic forces and their management in cruising flight, aircraft maneuver stability for managing flying qualities, etc.; b. Use the techniques, skills, and modern computational and information technology necessary for engineering practice (including definition of the combinations of aircraft aerodynamic features and propulsion methods for different cruising requirements, description of relationships between the performance prescriptions and the power and thrust requirements for steady flight); and c. Function professionally in multidisciplinary teams related to aircraft performance and flight management.
Subject Synopsis/ Indicative Syllabus	**Aircraft Aerodynamics** – Airfoil lift, drag and moments; Airfoil data; Compressibility correction; Finite wing aerodynamics; Induced drag; High-lift mechanisms. **Aircraft Performance** – Drag polar; Propulsion characteristics; Tradeoff between thrust availability and performance efficiency; Thrust and power requirements for cruising flight; Altitude effects; Climb and descent performance; Gliding flight; Takeoff and landing; Level turn, pull-up and pull-down. **Maneuvering Flight Management** – Equations of motion; Small perturbation theory; Flying qualities; Pitching moments of airfoil; Aerodynamic center and trim; Static and dynamic stability; Stability and control Longitudinal and lateral stability; Stalling and spinning; Flight management and guidance computers (FMGC).

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aspects of aerodynamic characteristics for aircraft as well as their influence in determining the aircraft performance and maneuver management for atmospheric flight (Outcomes a to c).

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

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignment	30%	✓	✓	✓
2. Test	20%	✓	✓	
3. Examination	50%	✓	✓	
Total	100%			

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

Overall Assessment:

0.50 × End of Subject Examination + 0.50 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by continuous assessment including assignment and test, which provide timely feedback to both lecturers and students on various topics of the syllabus. The in-class quiz (none assessment) will help students to better understand what they learn in the class. Homework and test are designed to enhance the students' learning of fundamental flight mechanics of an aircraft.

Student Study Effort Expected

Class contact:	
▪ Lecture	36 Hrs.
Other student study effort:	
▪ Week 7 Reading week	3 Hrs.

	▪ Self-study	45 Hrs.
	▪ Assignments	26 Hrs.
	Total student study effort	110 Hrs.
Reading List and References	1. Kermondes, A. C., Mechanics of Flight, Prentice Hall, latest edition. 2. Anderson Jr., J. D., Introduction to Flight, McGraw-Hill, latest edition. 3. Torenbeek, E., and Wittenberg, H., Flight Physics, Springer, latest edition. 4. Hull, D. G., Fundamentals of Airplane Flight Mechanics, Springer, latest edition. 4. Etkin, Bernard, Dynamics of Atmospheric Flight, John Wiley& Sons Inc., 1972.	

May 2025

Subject Description Form

Subject Code	AAE3012
Subject Title	Air Traffic Management and Airport Operations
Credit Value	3
Level	3
Pre-requisite	AAE2004 Introduction to Aviation System and Air Transport Regulation
Exclusion	AAE4003 Airport Services Engineering
Objectives	This subject will provide students with 1. Broad understanding of the airport services in all phases of design and engineering to students; and 2. The essential knowledge in airport facility planning, management and ground services.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Have the basic knowledge of how an airport is operating; b. Apply techniques to optimise the airport operations costs and efficiency, including capacity determination, airport facility selection, facility layout, and facility planning; and c. Establish effective ground manoeuvring such as airport geometry, terminal layout, aircraft configuration optimisation.
Subject Synopsis/ Indicative Syllabus	**Runway planning, analysis and maintenance** – Airfield design and planning (runway, taxiway and apron); Aircraft runway length and take-off weights; Runway slope; Obstacles; Bird control; Foreign object debris; Rubber removal; Runway inspection. **Airport facility planning and engineering** – Airport layout; Design of terminal facilities, baggage handling facilities, freight facilities; Layout planning and optimisation; Ground support equipment and equipment selection; Basic queuing theory and simulation (e.g., simulation of passenger flow for chokepoint analysis). **Air traffic flow and capacity management** – Ground delay programme (GDP): delay assignment (DAS) mode, general aviation airport programme (GAAP), unified delay program (UDP) mode; peak-hour analysis (design peak hour and forecast); Demand management (flight schedule coordination, congestion pricing, slot auction, etc.); Air traffic management (airspace structure, navigation systems, air traffic control tower); Collaborative decision making; Runway capacity (factors affecting runway capacity, e.g., number of runways, landscape, aircraft mix, wind direction, sequencing of movements, noise considerations); NextGen; Airport CDM.

<table>
<tr><td></td><td>Ground manoeuvring and gate planning – Ground operations, ground manoeuvring, gate operations, and terminal servicing; Airport geometry for operating new and existing aeroplane models; Terminal layouts and gate arrangements; Aircraft configuration optimisation.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Teaching is conducted through class lectures, case studies and project. Both the basic knowledge and theoretical models are going to be introduced. The understanding of how to address problems by using scientific tools is emphasised. Normally, examples of problem-solving techniques are taught in class and related scenarios are provided to students to enhance their application abilities. Guest speakers in the aviation industry will be invited to deliver talks and students are required to produce short reports for talks to encourage their involvement.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="3">Intended subject learning outcomes to be covered</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. Case study</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Project</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Case study reports</td><td>50%</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>2. Assignments</td><td>30%</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>3. Group project report</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

1.0 × Continuous Assessment

100% Continuous assessment consists of assignments, case study reports and group project report. Case study and group project reports are required to be submitted to show the findings.</td></tr>
</table>

Student Study Effort Expected	Class contact:	
	▪ Lecture	24 Hrs.
	▪ Case Study/ Project	15 Hrs.
	Other student study effort:	
	▪ Assignments/Min-Project/Report	35 Hrs.
	▪ Self-study/Preparation	48 Hrs.
	Total student study effort	122 Hrs.
Reading List and References	1. PS Senguttuvan 2007, Principles of Airport Economics, Excel Books. (or latest edition) 2. Airport Cooperative Research Program (ACRP) Reports, The National Academies of Sciences, Engineering, and Medicine. (or latest edition). 3. Anne Graham 2014, Managing Airports 4th Edition: An International Perspective, Routledge. (or latest edition). 4. Alexander T. Wells 2007, Air Transportation: A Management Perspective, Ashgate. (or latest edition). 5. Norman J. Ashford, Saleh Mumayiz, Paul H. Wright 2011, Airport Engineering: Planning, Design and Development of 21st Century Airports, John Wiley & Sons. (or latest edition).	

Revised in July 2022

Subject Description Form

Subject Code	AAE4002
Subject Title	Capstone Project
Credit Value	6
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: 1. The student should have completed most of the subjects required in previous years of the programme before taking this subject. The enrollment of this subject is subjected to the approval of the Project Coordinator and the project supervisor. Students should consult the project supervisor for the arrangement. 2. Students should complete at least 70% of their year three subjects. *Remark: If you have any special needs, please contact Prorgramme leader and Project coordinators for discussion.*
Objectives	To provide students an opportunity to utilise and integrate their knowledge of air transport engineering in a team effort to solve real life problems related to the aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify, formulate and solve problems in aviation engineering by applying knowledge of mathematics, science and engineering (including the understanding of the work of airport/airline/aircraft engineering operations); and b. Design and conduct experiments, as well as to analyse and interpret data (including designing and solving engineering problems in the aviation industry); and c. Use the techniques, skills and modern engineering tools, including the computational tools necessary for engineering practice (including applying knowledge and up-to-date technologies designing); and d. Function professionally in multidisciplinary teams; and e. Communicate effectively and professionally with appropriate languages and tools.
Subject Synopsis/ Indicative Syllabus	A project team consisting normally of three students will be expected to complete an industry-related project or an academic-related project in the field of air transport engineering, which may cover the areas of aircraft maintenance engineering, aircraft design and modification, logistics engineering, flight planning and scheduling, system design and modification. The team of students is expected to go through the following stages of work: • Problem identification

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

- Literature review
- Methodology of study
- Project execution
- Report writing
- Project presentation

</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>

The project is trained through guided studies. Each team of students is allocated a project title, objectives, description, and a project supervisor and an industrial supervisor (if applicable), who guide the team through the various stages of the project. For industrial-related projects, one academic and one industrial supervisor will be assigned to each student team.

Student team working on industrial-related projects may be eligible for fulfilling WIE requirement. To be eligible, student shall demonstrate frequent contact and close involvement with the industrial supervisor and/or industrial organisation, and submit the necessary WIE required documentations.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="5">Intended subject learning outcomes to be covered</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Site visit</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Guided study</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Oral presentation</td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>4. Report writing</td><td></td><td></td><td>✓</td><td></td><td>✓</td></tr>
</table>

</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Interim report</td><td>20</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final report</td><td>50</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Oral examination</td><td>30</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="5"></td></tr>
</table>

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

Overall Assessment: 1.0 x continuous assessment

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

	Performance of each student is individually assessed together with the team's overall performance by the supervisor(s), an independent assessor, and their team members, based on their working attitude, quality of works, and report writing. Their communication skill is assessed through the oral presentation by an oral examination panel of at least two academic staff. As a part of the assessment process, each group member is required to specify his/her own contribution to the project, and estimate and compared to the contribution of his/her teammates via peer assessment. The supervisor conducts continuous monitoring of the project team as a whole and of each group member. The supervisor monitors and assesses the overall and individual progresses through regular meetings and guided studies. In case of an industrial-based project, comments from the industrial supervisor is invited, but he/she is not be required to perform the formal assessment. Both the project supervisor and the independent assessor assess the interim report and the final report. Based on the peer assessment, due consideration of each student's individual contribution to the project at these two stages will be taken into account. In case of an industrial-based project, comments from the industrial supervisor may be invited but he/she is not be required to perform the formal assessment. In the oral examination, every team member is required to present the project especially on his/her significant contributions, and address the questions by the oral examination panel. Marks for oral examination is awarded to individual student by taking into account the group's overall performance.	
Student Study Effort Expected	Class contact:	
	▪ Guided study	52 Hrs.
	Other student study effort:	
	▪ Conducting project	99 Hrs.
	▪ Literature review and private study	66 Hrs.
	▪ Training (Report writing)	26 Hrs.
	Total student study effort	**243 Hrs.**
Reading List and References	To be advised by supervisor	

Jul 2025

Subject Description Form

Subject Code	AAE4004
Subject Title	Airworthiness and Regulations
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims at providing students with the fundamental concepts and principles of airworthiness; and the associated regulations from an international perspective in aircraft design, production, operation and maintenance. As airworthiness has to be considered as a coherent process from the design of aircraft to the monitoring of its technical condition in airline service, this subject covers topics on both initial airworthiness and continuing airworthiness. In addition, the economical, ethical and sustainability challenges of contemporary airworthiness issues will also be introduced. Based on the ICAO framework, this subject covers the airworthiness related regulations and requirements of European Union, the U.S.A. and Hong Kong. As such, the students understand the relationship and legal obligations pertaining to the stakeholders of the airworthiness processes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate an understanding and knowledge of the essential facts, concepts and principles associated with airworthiness and the underpinning regulations and requirements for initial and continuing airworthiness); and b. Demonstrate a knowledge of the contemporary airworthiness issues; and understanding of the economical, ethical and sustainability challenges facing initial and continuing airworthiness; and c. Function professionally in multidisciplinary teams.
Subject Synopsis/ Indicative Syllabus	**General** – Contemporary Global Safety Level; Commercial Air Transport; Evolution of Airworthiness Standards; Initial Airworthiness; Continuing Airworthiness; and Airworthiness vs Flight Safety. **Air Legislation** – ICAO; Chicago Convention; Annexes 1, 6, 7, 8, 16 and 19; EASA Regulation Structure; FAA Regulation Structure; Hong Kong Air Legislation System; Civil Aviation Ordinance (CAP448) and Air Navigation (Hong Kong) Order 1995 (CAP448C) **Aircraft Documentation, Certification and Requirements-** Initial Airworthiness; EASA; EASA Part-21, CS-23, 25,27 and 29; Type Design; Type-Certificates; Type-Certificate Data Sheets; Supplemental Type-Certificates; System Safety Assessment; type certificate validation and CS-25 vs FAR Part 25. Weight schedule; External and internal markings and signs, Certificate of Airworthiness Categories, purposes of flight; Certificate of Registration; Noise Certificate; Schedule 5 requirements for equipment; Radio station license, Change of ownership, Maintenance checks and inspections, Maintenance records; Maintenance documentation. Continuing Airworthiness; Service Bulletins, manufacturers service information; Modifications and repairs; Test flights; EDTO: maintenance and dispatch requirements; CAD 359 Low Visibility Operations (LVO); Reduced Vertical Separation Minima (RVSM) requirements.

	Operator Responsibilities –AN(HK)O 1995 Article 6; CAD 360; Maintenance Support Arrangement; Contracting-out Maintenance; Master Minimum Equipment List; Minimum Equipment List; Configuration Deviation List. **Continuing Airworthiness Management-**AN(HK)O 1995 Article 9; HKAR-181; HKAR 1.3-4 Renewal of Certificate of Airworthiness; Certificate of Maintenance Review; Renewal; Maintenance Programme; Reliability Programme; and Airworthiness Directives; Defect Reporting, Logbooks for Aircraft, Engine and Variable Propeller and Technical Logs, Maintenance Records.**Approvals-**AN(HK)O Article 11; HKAR-21; HKAR-145;–Safety & Quality System; Maintenance Organisation Exposition; Line Maintenance; Base Maintenance; Component Maintenance; Specialised Services; Certifying Staff, Support Staff, Human Factors in Maintenance; Occurrence Reporting; Certificate of Return to Service; HKAR-181 and HKAR-183. **Supply Chain and Inventory Management -** Stock control and inventory management, Classes of aviation materials and determination of the inventory level for each class using different techniques, Importance of effective inventory management, and the related supply chain, on cost optimisation. Acceptance of Aircraft Components: AN17 and Appendix 1, Impact of technical spares on Continuing Airworthiness. **Aircraft Maintenance Schedule –** how the Type Certificate holder develops the initial maintenance programme, using the reliability centred maintenance (RCM) or maintenance steering group 3 (MSG-3) methodology, for the operator to maintain the continuing airworthiness of its fleet in a cost- effective manner. The processes to obtain the approval of the maintenance programme from the State of Registry based on CAD 452 and CAD 418; Estimation of maintenance manhours for non-routine tasks. **Licensing of Maintenance Personnel** –HKAR-66; HKAR-147; Hong Kong Airworthiness Notices; Licence Categories; Licence Privileges; Maintenance Training Organisation Exposition; Approved Basic Training Course; and Aircraft Type/Task Training; Joint Maintenance Management (JMM); Technical Arrangement on Aviation Maintenance with Foreign Regulatory Authorities
Teaching/Learning Methodology	Lectures are used to deliver the knowledge of airworthiness topics to the students. Case study will be used to foster students' understanding of the subject matters. Industrial experts will be invited to share their experience and provide case studies to the students.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	50%	✓		✓
2. Assignment	20%	✓		
3. Reports and presentation (Case Study)	30%		✓	
Total	100 %			

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

Overall Assessment:

0.6 x End of Subject Examination + 0.4 x Continuous Assessment

Examination is adopted to assess students' understanding on aircraft regulations, maintenance process and procedure and basic airworthiness related information. Site visits are used to provide the students real insight on aircraft maintenance process and opportunities to communicate with aviation professionals in the field. Case study report provides the students self-study opportunity to study and analyze different cases of aircraft problems related to airworthiness.

Student Study Effort Expected

Class contact:	
▪ Lecture	36 Hrs.
▪ Other student study effort:	
▪ Week 7 reading week	3 Hrs
▪ Assignments	20 Hrs.
▪ Report	60 Hrs.
Total student study effort	**119 Hrs.**

Reading List and References

1. De Florio, Filippo, Airworthiness: An Introduction to Aircraft Certification and Operations, Third edition. Butterworth-Heinemann is an imprint of Elsevier, 2016.
2. Kritzinger, Duane, Aircraft System Safety: Assessments for Initial Airworthiness Certification. Woodhead Publishing is an imprint of Elsevier, 2017.
3. Cusick, Stephen, Commercial Aviation Safety, Sixth edition. McGraw Hill Professional, 2017.
4. Kinnison, Harry, Aviation Maintenance Management, Second edition. McGraw Hill Professional, 2012.
5. Friend, C. H., Aircraft Maintenance Management. Longman Aviation

	Technology, 1992. 6. Fielder, John, The DC-10 Case: A Study in Applied Ethics, Technology, and Society. State University of New York State, 1992.

May 2025

Subject Description Form

Subject Code	AAE4006
Subject Title	Flight Mechanics and Control Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE3004 Dynamical Systems and Control
Objectives	To provide students with a deep understanding of flight dynamics, static and dynamic stability and feedback control systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design systems, components or processes to meet desired needs (including the basic modes of motion, related mechanism of fixed-wing aircraft and formulation of motion of a rigid systemic aircraft); and b. Use the techniques, skills and modern computational and information technology necessary for engineering practice (including analysis of equilibrium and stability for fixed-wing aircraft); and c. Function professionally in multidisciplinary teams.
Subject Synopsis/ Indicative Syllabus	**Introduction –** Mathematical tools for flight mechanics and control, configuration aerodynamics, flight performance, components of an automatic flight control system. **Flight Dynamics –**Reference frames, aircraft equation of motion, static equilibrium and trim, lift and pitching moment, control force, static longitudinal and lateral stability, linearised equation of motion, longitudinal dynamics, lateral-directional dynamics, maneuvering flight. **Aerodynamic Stability and Control** – Flying qualities requirements, stability and control derivatives, stability of longitudinal dynamics, stability of lateral-directional dynamics. **Flight Control Systems Design and Analysis –** Design of a flight control system based on linearised equations of motion, analyse the open loop response of the flight control system, analyse the closed-loop response of the flight control system, analyse the closed-loop stability.

Teaching/Learning Methodology

Lectures aim at providing students with an integrated knowledge required for understanding aircraft performance, static stability, dynamic stability and-feedback control. Theories and examples will be presented to cover the syllabus on general equations of motion for aircraft, models of aircraft, and conditions for equilibrium, linearisation and solution of equations of motion. This forms the basis for analysis of trajectories, modes of motion as well as control analysis and synthesis.

Tutorials aim at enhancing the analytical skills of the students. Examples will be provided to teach students the skills of solving different flight mechanics and control problems using the knowledge of dynamic system and feedback control techniques. Students will be able to solve real-life problems using the knowledge they acquired in the class.

Experiments will provide students with experience in simulating the aircraft motion and how its configuration affects stability and control. The students are motivated to make assumptions to simplify a flight mechanics problem and then develop an automatic flight control system. These experiments are designed to train students how to apply theories to practical applications, how to analyse and present experimental data.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Laboratory		✓	✓
3. Tutorial	✓	✓	✓

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	15%	✓	✓	
2. Class test	20%	✓	✓	
3. Laboratory report	25%		✓	✓
4. Examination	40%	✓	✓	
Total	100 %			

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

Overall Assessment:

0.4 × End of Subject Examination + 0.6 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability to apply the concepts. It is supplemented by tests, homework and laboratory reports which provided timely feedback to both lecturers and the students on various topics of the syllabus.

Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Laboratory/Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	42 Hrs.
	▪ Week 7 reading week	3 Hrs.
	▪ Homework assignment	12 Hrs.
	▪ Laboratory report	12 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. Stevens, B. L. and Lewis F. L., Aircraft Control and Simulation, John Wiley & Sons, latest edition. 2. Mclean, D. Automatic Flight Control Systems, Prentice Hall International 3. Etkin, B and Reid, L.D., Dynamics of Flight, John Wiley, latest version	

May 2025

Subject Description Form

Subject Code	AAE4012
Subject Title	Capstone Project
Credit Value	6
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: 1. The student should have completed most of the subjects required in previous years of the programme before taking this subject. The enrollment of this subject is subjected to the approval of the Project Coordinator and the project supervisor. Students should consult the project supervisor for the arrangement. 2. Students should complete at least 70% of their year three subjects. *Remark: If you have any special needs, please contact Prorgramme leader and Project coordinators for discussion.*
Objectives	To provide students an opportunity to utilise and integrate their knowledge of air transport engineering in a team effort to solve real life problems related to the aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify, formulate, and solve problems in aviation engineering by applying knowledge of mathematics, science, and engineering (including the understanding of the work of airport/airline/aircraft engineering operations); b. Design and conduct experiments, as well as to analyse and interpret data (including designing and solving engineering problems in the aviation industry); c. Use the techniques, skills, and modern engineering tools, including the computational tools necessary for engineering practice (including applying knowledge and up-to-date technologies designing); d. Function professionally in multidisciplinary teams; and e. Communicate effectively and professionally with appropriate languages and tools.
Subject Synopsis/ Indicative Syllabus	A project team consisting normally of three students will be expected to complete an industry-related project or an academic-related project in the field of air transport engineering, which may cover the areas of, but not limited to the following areas: • Aircraft maintenance routing problem

	• Air traffic control and air traffic flow operations • Airside and landside operations • Airport facility layout and design • Airline fleet operations and management • Crew pairing and rostering problem • Aircraft cabin interior design and modification • Air logistics engineering • Flight route planning and scheduling • Human factors and ergonomics design in aviation system and modification. The team of students is expected to go through the following stages of work: • Problem identification • Literature review • Research methodology • Numerical study, results analysis, and discussion • Project execution • Report writing • Project presentation
Teaching/Learning Methodology	The main component of the project is guided studies. Each team of students is allocated a project title, objectives, description, and a project supervisor and an industrial supervisor (if applicable). The project supervisor would guide the team through the various stages of the project. For industrial-related projects, one academic and one industrial supervisor will be assigned to each student team. Student team working on industrial-related projects may be eligible for fulfilling WIE requirement. To be eligible, student shall demonstrate frequent contact and close involvement with the industrial supervisor and/or industrial organisation, and submit the necessary WIE required documentations.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered				
	a	b	c	d	e
1. Site visit	✓				
2. Guided study	✓	✓	✓	✓	✓
3. Oral presentation					✓
4. Report writing			✓		✓

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. Interim report	20	✓	✓	✓	✓	✓
2. Final report	50	✓	✓	✓	✓	✓
3. Oral examination	30	✓	✓			✓
Total	100 %					

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

Overall Assessment:

1.0 × Continuous Assessment

Performance of each student is individually assessed together with the team's overall performance by the supervisor(s), an independent assessor, and their team members, based on their working attitude, quality of works, and report writing. Their communication skill is assessed through the oral presentation by an oral examination panel of at least two academic staff.

As a part of the assessment process, each group member is required to specify his/her own contribution to the project, and estimate and compared to the contribution of his/her teammates via peer assessment.

The supervisor conducts continuous monitoring of the project team as a whole and of each group member. The supervisor monitors and assesses the overall and individual progresses through regular meetings and guided studies. In case of an industrial-based project, comments from the industrial supervisor are invited, but he/she is not required to perform the formal assessment.

	Both the project supervisor and the independent assessor assess the interim report and the final report. Based on the peer assessment, individual contribution to the project will be considered in these two assessments. In case of an industrial-based project, comments from the industrial supervisor may be invited, but he/she is not be required to perform the formal assessment. In the oral examination, every team member is required to present the project especially on his/her significant contributions, and address the questions by oral examination panel. Marks for oral examination is awarded to individual student by considering the group's overall performance.	
Student Study Effort Expected	Class contact:	
	▪ Guided study	52 Hrs.
	Other student study effort:	
	▪ Conducting project	99 Hrs.
	▪ Literature review and private study	66 Hrs.
	▪ Training (Report writing)	26 Hrs.
	Total student study effort	243 Hrs.
Reading List and References	To be advised by supervisor	

Jul 2025

Subject Description Form

Subject Code	AAE4301
Subject Title	Avionics Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge of communications, electronics aspects of avionics, including aircraft instruments and integrated systems, and navigation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) understand the function and possess essential knowledge and skills the components of avionics systems. b) use the techniques, skills and modern computational and information technology necessary for engineering practice; and c) extend the knowledge of avionics systems to different situations of professional engineering context to communicate effectively and professionally with appropriate languages and tools in avionics system.
Subject Synopsis/ Indicative Syllabus	**Communications System:** the working principles of VHF radio, Datalink communication, Satellite communication, and etc. **Navigation System:** the working principles of NDB, VOR, DME, ILS, Satellite navigation, and etc. **Surveillance System:** the working principles of PSR, SSR, TCAS, ADS-B, and etc. **Air Data Computer:** the working principles of Pitot, Barometer and Machmeter, Air data instrument, and etc. **Inertial Navigation System:** Magnetometer, Gyroscope, Accelerometer, Gimbal and strapdown INS, Dead-reckoning.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions.
2. Lectures are aimed at providing students with an integrated knowledge required for understanding fundamental concepts in guidance, navigation and advanced avionics systems. Theories and examples will be presented to cover the syllabus.
3. Tutorials are aimed at enhancing the analytical skills of the students. Examples will be provided to teach students the skills of designing advanced guidance laws and avionics systems. Students will be able to solve real-life problems using the knowledge they acquired in the class.

Teaching/Learning Methodology	Intended subject learning outcome		
	a	b	c
Lecture/Tutorial	✓	✓	✓

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. Lab	10%	✓	✓	
3. Case study presentation	30%			✓
4. Examination	40%	✓	✓	
Total	100 %			

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

Overall Assessment:

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

The continuous assessment consists of three components: homework assignments, lab and case study 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/Tutorial	39 Hrs.
Other student study effort:	
▪ Self-Study	44 Hrs.

	▪ Case Study	22 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Helfrick A, Principles of Avionics, 9th Edition, Avionics Communications, 2015. 2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009. 3. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011. 4. Kayton Myron Walter R. Fried, Avionics Navigation Systems, Second Edition, John Wiley and Son, Published online 2007. 5. Pilot's Handbook of Aeronautical Knowledge, U.S. Department of Transportation, FAA, Flight Standards Service, 2008. 6. Advanced Avionics Handbook, U.S. Department of Transportation, FAA, Flight Standards Service, 2009. 7. Alexander V. Nebylov, Aerospace sensors, Momentum Press, 2013.	

Jun 2024

Subject Description Form

Subject Code	AAE4903
Subject Title	Human Factors in Aviation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with fundamental human factors concepts and develop students' understanding of the applied multi-disciplinary approach mostly concerned on airline transport pilot perspective.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the basic concepts of human factors HF in the aviation industry; b. Explain the application of ergonomics in flight deck design; and c. Identify and explain the human errors in airport operations, air traffic control, and pilot operation.
Subject Synopsis/ Indicative Syllabus	**Basic Concepts:** Basic Aviation Physiology**:** Basics of flight physiology, Vision, Hearing, Equilibrium, Integration of sensory inputs. Health Maintenance**:** Body rhythm and sleep, Problem areas for pilots, Incapacitation in flight; **Research methods:** Statistical analysis, Experiment design, Expert interview, Simulation. **Cognitive Ergonomics** - Human information processing, Attention and vigilance, Perception, Memory, Response selection, Human error and reliability, Mental models and situation awareness, Theory and model of human reliability, Error management, Safety awareness, Coordination (multi-crew concepts), Cooperation, Communication, Cockpit management: Personality, attitude and behavior, Display, Fatigue and stress management, Advanced cockpit automation. **Physical Ergonomics**: Anthropometry, Posture, Design strategies, Workstation design.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation systems (outcomes a to c).

Group projects are used to help students to deepen their knowledge on a specific topic through search of information, analysis of data and report writing (outcomes a to c).

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Project	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments	15%	✓	✓	✓
2. Group project	20%	✓	✓	✓
3. In-class Test	15%	✓	✓	✓
4. Final Exam	50%	✓	✓	✓
Total	100%			

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

Overall Assessment:

0.5 × Continuous Assessment + 0.5 × Final Exam

The final exam and In-class test is adopted to assess students on the overall understanding and the ability of applying the concepts. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. In particular, group project is used to assess the students' capacities of self-learning and problem-solving and effective communication skill in English so as to fulfill the requirements of working in the aviation industry.

Student Stud Effort Expected	Class contact:	
	▪ Lecture	36 Hrs.
	Other student study effort:	
	▪ Week 7 reading week	3 Hrs.
	▪ Course work	21 Hrs.
	▪ Self-study	65 Hrs.
	Total student study effort	125 Hrs.
Reading Lis and References	1. Salas, Eduardo, Florian Jentsch, and Dan Maurino, eds. Human factors in aviatio Academic Press, 2010. 2. Oxford ATPL Manual 8 - Human Performance & Limitations - EASA, 1st Editio Oxford Publishing. 3. FAA (2007)**.** Operator's manual: Human factors in airport Operations. 4. Reason J.T. & Hobbs, A.. Managing Maintenance Error: A Practical Guide. Ashgat latest edition.	

May 2025

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
Exclusion	AF2618
Objectives	This subject aims to equip students with 1. The fundamental concepts of micro- and macroeconomics related to the engineering industry; 2. The fundamental understanding of finance and costing for engineering operations, budgetary planning and control.
Intended Subject Learning Outcomes	**Upon successful completion of this subject, students will be able to:** 1. Understand how the relevant economic factors shape the environment within which an engineering company operates; 2. Evaluate the financial condition of a company; 3. Apply the basic cost accounting techniques in the planning and control of engineering and production activities.
Subject Synopsis/ Indicative Syllabus	Economic Environment of a Firm **Microeconomic Factors** Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition and monopoly **Macroeconomic Factors** International trade and globalization Engineering Economics Return on investment; Accounting profit versus economic profit Fundamentals of Budgetary Planning and Control Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives
Teaching/ Learning Methodology	The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students' understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.

<table>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific Assessment Methods/Tasks</th><th rowspan="2">% Weighting</th><th colspan="3">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>Continuous Assessment</td><td>50%</td><td></td><td></td><td></td></tr>
<tr><td>1. In-class activities</td><td>15%</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Written assignments</td><td>15%</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Test</td><td>20%</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Final Examination</td><td>50%</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
</table>
</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>• Lecture</td><td>26 Hours</td></tr>
<tr><td>• Tutorial</td><td>13 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Study and self-learning</td><td>48 Hours</td></tr>
<tr><td>• Presentation preparation and written assignments</td><td>18 Hours</td></tr>
<tr><td>Total student study effort:</td><td>105 Hours</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>Recommended Textbooks

1. Parkin and Bade, Foundations of Microeconomics, 8th ed., Pearson, 2018.
2. Sullivan, Wicks and Koelling, Engineering Economy, 17th ed., Pearson, 2019.

References

1. Robert H. Frank, The Economic Naturalist: Why Economics Explains Almost Everything?, Basic Books, 2011.</td></tr>
<tr><td>Last Updated</td><td>July 2023</td></tr>
<tr><td>Prepared by</td><td>School of Accounting and Finance</td></tr>
</table>

Subject Description Form

Subject Code	AMA1110
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics
Credit Value	3
Level	1
Pre-requisite	Nil
Exclusion	Calculus and Linear Algebra (AMA1007) Calculus for Engineers (AMA1130) Calculus (AMA1131) Foundation Mathematics for Accounting and Finance (AMA1500) Calculus (AMA1702)
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) apply analytical reasoning to solve problems in science and engineering; (b) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; (c) apply mathematical modeling in problem solving; (d) demonstrate abilities of logical and analytical thinking.
Subject Synopsis/ Indicative Syllabus	Elementary calculus: Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus. Elementary Probability and Statistics: Descriptive statistics, random variables, probability and probability distributions, binomial, Poisson and normal distributions, applications. Population and random samples. Sampling distributions related to sample mean, sample proportions, and sample variances. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean and the difference between two means.

<table>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and elementary techniques of differential and integral calculus and elementary statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Assignments and mid-term tests</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

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

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

The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Homework and self-study</td><td>81 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>Chung, K.C. A Short Course in Calculus and Matrices, McGraw Hill 2013</td></tr>
</table>

	Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013 Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012 Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012

Subject Description Form

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

Linear algebra: Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer’s rule, vectors in 2-space or in 3-space, applications to geometry.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and elementary techniques of differential and integral calculus and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Assignments and tests</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>

Continuous Assessment comprises of assignments and tests. An examination is held at the end of the semester.</td></tr>
</table>

	Questions used in assignments, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: *The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.*	
Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	Chung, K.C. *A Short Course in Calculus and Matrices*, McGraw Hill 2013 Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013 Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012 Larson, R. *Elementary Linear Algebra*, Brooks/Cole 2013	

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus and Linear Algebra (AMA1007) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120) or Calculus for Engineers (AMA1130) or Calculus (AMA1131) or Foundation Mathematics for Accounting and Finance (AMA1500)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007/AMA2707) Mathematics for Engineers (AMA2131/AMA2308) Engineering Mathematics (AMA2380) Applied Mathematics I (AMA2511) Mathematics for Scientists and Engineers (AMA2882) Engineering Mathematics (AMA290)
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	1. <u>Algebra of complex numbers</u> Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number. 2. <u>Linear algebra</u>

<table>
<tr><td></td><td>Systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications.
3. Ordinary differential equations
ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits.
4. Differential calculus of functions of several variables
Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>1.Homework, quizzes and mid-term test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="5"></td></tr>
</table>
Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.
Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.</td></tr>
<tr><td></td><td>Class contact:</td><td></td></tr>
<tr><td></td><td>• Lecture</td><td>26 Hours</td></tr>
</table>

Student Study Effort Expected	• Tutorial	13 Hours
	• Mid-term test and examination	
	Other student study effort	
	• Assignments and Self study	78 Hours
	Total student study effort:	**117 Hours**
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2015. 2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited 5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017	

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite	Mathematics I (AMA2111)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007/AMA2707) Introduction to Differential Equations (AMA2008)
Objectives	This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	1. <u>Multiple integrals</u> Double and triple integrals, change of variables, applications to problems in geometry and mechanics. 2. <u>Vector calculus</u> Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics. 3. <u>Series expansion</u> Infinite series, Taylor's expansion, Fourier series expansion of a periodic function.

<table>
<tr><td></td><td>4. <u>Partial differential equations</u>
Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>1. Assignments, quizzes and mid-term test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="5"></td></tr>
</table>

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

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

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

The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>• Lecture</td><td>26 Hours</td></tr>
<tr><td>• Tutorial</td><td>13 Hours</td></tr>
<tr><td>• Mid-term test and examination</td><td></td></tr>
<tr><td>Other student study effort</td><td></td></tr>
<tr><td>• Assignments and Self study</td><td>78 Hours</td></tr>
<tr><td>Total student study effort:</td><td>117 Hours</td></tr>
</table>
</td></tr>
</table>

Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2015. 2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited 5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017

Subject Description Form

Subject Code	AP10001
Subject Title	Introduction to Physics
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: AP1D03 “How Things Work: the Physics of Everyday Life"
Objectives	This is a subject designed for students with no background in physics studies. Fundamental concepts in major topics of physics (mechanics, heat, wave and electromagnetism) will be discussed. The aim of this subject is to equip students with some basic physics knowledge, and to appreciate its applications in various branches of science and technology.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) solve simple problems in kinematics Newton’s law and Energy; (b) solve problems in heat capacity and latent heat; (c) explain phenomena related to the wave character of light; (d) apply the superposition of waves; (e) understand electrostatic field and potential; (f) solve problems on interaction between current and magnetic field; and (g) describe and demonstrate the phenomenon of electromagnetism.
Subject Synopsis/ Indicative Syllabus	**Mechanics**: scalars and vectors; kinematics and dynamics; Newton’s laws; momentum, impulse, work and energy; conservation of momentum and conservation of energy. **Thermal physics**: heat and internal energy; heat capacity; conduction, convection and radiation; latent heat. **Waves**: nature of waves; wave motion; reflection and refraction; image formation by mirrors and lenses; superposition of waves; standing waves; diffraction and interference; electromagnetic spectrum; sound waves. **Electromagnetism**: charges; Coulomb’s law; electric field and potential; current and resistance; Ohm’s law; magnetic field; magnetic force on moving charges and current-carrying conductors; Faraday’s law and Lenz’s law.
Teaching/Learning Methodology	**Lecture**: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
(1) Continuous assessment	40	✓	✓	✓	✓	✓	✓	✓
(2) Examination	60	✓	✓	✓	✓	✓	✓	✓
Total	100							

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students' study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected

Class contact:	
• Lecture	33 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort	120 h

Reading List and References

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

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

Radi, Hafez A., and John O. Rasmussen. **Principles of Physics for Scientists and Engineers**. Berlin ; New York: Springer, 2013. Undergraduate Lecture Notes in Physics. Web.

Subject Description Form

Subject Code	AP10005
Subject Title	Physics I
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) solve simple problems in single-particle mechanics using calculus and vectors; (b) solve problems in mechanics of many-particle systems using calculus and vectors; (c) understand simple harmonic motion and solve simple problems; (d) solve problems related to acoustic standing waves; (e) calculate changes in frequency received due to Doppler's effect; (f) apply ideal gas laws to solve problems; (g) apply the first law of thermodynamics to simple processes; and (h) solve simple problems related to the cyclic processes.
Subject Synopsis/ Indicative Syllabus	**Mechanics**: calculus-based kinematics, dynamics and Newton's laws; calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; conservation law; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves. **Thermal physics**: ideal gas and kinetic theory; work, heat and internal energy; first law of thermodynamics; entropy and the second law of thermodynamics; Carnot cycle; heat engine.
Teaching/Learning Methodology	**Lecture**: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							
		a	b	c	d	e	f	g	h
(1) Continuous assessment	40	✓	✓	✓	✓	✓	✓	✓	✓
(2) Examination	60	✓	✓	✓	✓	✓	✓	✓	✓
Total	100								

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students' study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected

Class contact:	
• Lecture	33 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort:	120 h

Reading List and References

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

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

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

Subject Description Form

Subject Code	AP10006
Subject Title	Physics II
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with fundamental knowledge in physics focusing on the topics of waves and electromagnetism. This course prepares students to study science, engineering or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) apply simple laws in optics to explain image formation; (b) understand phenomena related to the wave character of light; (c) solve problems in electrostatics; (d) solve problems on interaction between current and magnetic field; (e) apply electromagnetic induction to various phenomena; and (f) solve problems in simple circuits.
Subject Synopsis/ Indicative Syllabus	**Waves and optics**: nature of light, reflection and refraction; Snell's law; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen's principle; interference and diffraction; diffraction grating; Rayleigh's criterion and optical resolution; polarization. **Electromagnetism**: charge and Field; Coulomb's law and Gauss' law; electrostatic field and potential difference; capacitors and dielectric; current and resistance; Ohm's law; electromotive force, potential difference; Lorentz force; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; induction; transformers; AC circuits and applications.
Teaching/Learning Methodology	**Lecture**: The fundamentals in optics and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	
(1) Continuous assessment	40	✓	✓	✓	✓	✓	✓	
(2) Examination	60	✓	✓	✓	✓	✓	✓	
Total	100							

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students' study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected

Class contact:	
• Lecture	33 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort	120 h

Reading List and References

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

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

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

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	CLC3243P (2019-20 onward) CBS3243P (2018-19 and before)
Subject Title	Chinese Communication for Aviation
Credit Value	2
Level	3
Pre-requisite / Co-requisite	
Objectives	This is a discipline-specific Chinese subject which aims at developing the students' language competence in Putonghua and written Chinese for professional communication necessary for them to communicate effectively with various parties and stakeholders in the sector of aviation.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to: a. read and write professional reports / manuals for specific purposes; b. understand and use the terminology of Aviation and Aeronautics in Chinese; c. produce discipline-related Chinese genres (e.g. notices, guidelines, Aeronautical circulars, other formal letters / emails) with appropriate text structures, interactive strategies and language expressions for different intended readers; d. communicate in Putonghua for various speech functions in professional context of Aviation such as introducing, clarifying and explaining.
Subject Synopsis/ Indicative Syllabus	1. Reports in Chinese in the Aviation area • Planning and organizing reports • Explaining the background, rationale, objectives, scope and significance of a report • Referring to the literature to substantiate reports 2. Specific Chinese writing in a wide range of genres • Profession-related literacy in written Chinese for both internal and external purposes, such as writing of notices, guidelines and

<table>
<tr><td></td><td>Aeronautical circulars, etc.

3. Oral presentations
• Giving formal presentations and engaging in formal discussions in Putonghua
• Selecting contents for audience-focused presentations
• Choosing language and style appropriate to the intended audience</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject is designed to develop the students' Chinese language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of aviation-related projects. It builds upon the language and communication skills covered in GUR language training subjects.

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

The learning and teaching activities in the subject will focus on a course-long report which will engage students in proposing on an aviation-related report to different intended readers/audiences. During the course, students will be involved in:
- planning and researching
- writing and reporting
- giving oral presentations to intended stakeholders in Putonghua</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1. Practical Writings.</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>3. Oral Assessments</td><td>40%</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Subject assessment 100% coursework

For the course work, students will be assessed by the final products of the assigned exercises.
</td></tr>
</table>

	Each assignment will be assessed in terms of criterion reference assessing. The overall achievement is obtained by formative assessment. Students may use GenAI in assessment unless they have been told otherwise before the assessment. The work submitted for assessment must be students' own work. The submitted work may not be accepted for the purpose of assessment if its authenticity is questionable. Third-party materials (included AI-generated materials) used in the work must be properly referenced. Submitting third-party materials as their own work is an act of academic dishonesty and will lead to disciplinary actions. Departments and subject teachers have the discretion to request students to make an honour declaration for the authenticity of the work they submit for assessment.	
Student Study Effort Expected	Class contact:	
	▪ Seminars	26 Hrs.
	Other student study effort:	
	▪ Outside class practice, e.g. planning, discussing, and writing assignments and report. ▪ Researching and self-study	56 Hrs.
	Total student study effort	82 Hrs.
Reading List and References	1. 民用航空術語編輯組（2002）《民用航空旅客運輸術語》。中國標準出版社。 2. 民用航空術語編輯組（2002）《民用航空貨物運輸術語》。中國標準出版社。 3. 于成鯤主編（2003）《現代應用文》。復旦大學出版社。 4. 于成鯤等主編（2011）《當代應用文寫作規範叢書》。復旦大學出版社。 5. 邵敬敏（2007）《現代漢語通論》。上海教育出版社。 6. 鄭笑平（2005）《科技寫作》。河南人民出版社。 7. 劉金同等主編. (2019). 應用文寫作教程 (第 4 版)（高等學校應用型特色規劃教材）. 清華大學出版社. 8. 吳仁麟, 李慶芳. (2023). AI 時代的思考與寫作. 布克文化	

	9. 郭莉, 郝麗霞. (2017). 經濟應用文寫作 (第 3 版)（高等學校應用型特色規劃教材）. 清華大學出版社.

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	ELC3531
Subject Title	Professional Communication in English for Engineering Students
Credit Value	2
Level	3
Pre-requisite / Co-requisite	English LCR subjects
Objectives	This subject aims to develop the language competence for professional communication in English required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in English, students will be able to: a. plan, organise and produce professionally acceptable project proposals with appropriate text structures and language for different intended readers b. plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis / Indicative Syllabus	*Synopsis* This subject enables students to develop the transferrable thinking, language, and communication skills that they will employ as aspiring professionals in the engineering field. Topics include analysis, clarity, appropriacy and persuasion in language and communication. Through a course-long engineering-related project, students will produce a professional project proposal on a creative solution which addresses problems and needs in the society, and deliver an effective pitch justifying the need for the project and the feasibility of the idea. In both tasks, students are required to demonstrate critical research and thinking when planning, organising and producing written and spoken discourses. They are also required to employ advanced language and communication strategies to convey meaning clearly, accurately, appropriately, and persuasively to different audiences.

	1. Project proposal in English • understanding and analysing problems, needs and requirements • analysing the structure and language of project proposals • extracting and evaluating information • discussing project ideas with the teacher and peers • developing and writing goals, objectives, and informed solutions based on critical analysis • integrating well-researched evidence and discipline specific knowledge clearly and convincingly • organising content logically and coherently • employing advanced language and communication strategies to convey meaning clearly, accurately, appropriately, and persuasively • producing a professional and reader-friendly document • peer-reviewing other proposals and reflecting on their project proposal 2. Project pitch in English • having a clear presentation purpose • selecting appropriate content and evidence • adapting language and style appropriate to the purpose, context and intended audience • employing advanced communication strategies and language features to convey meaning clearly, accurately, appropriately, and persuasively • speaking with clarity (including clear pronunciation) • speaking with fluency and confidence • using effective verbal and non-verbal interactive strategies • using visuals and text to support the spoken message • handling questions professionally • establishing rapport and connection with the audience
Teaching/Learning Methodology	The subject is designed to develop the English language skills, both oral and written, that students need to use to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects. Classes are seminar / workshop based. The lessons and materials help students to articulate and pitch their ideas in professionally acceptable language structures, text formats and registers. Activities include discussions, sample analysis, student-led

investigations, process writing, peer reviews and mini-presentations. Online resources are integrated into the course for in-class and out-of-class learning. Students' personal integrity in the fast-changing technological landscape is also nurtured.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c			
1. Project proposal in English	40%	√		√			
2. Project pitch in English	60%		√	√			
Total	100%						

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

Project proposal in English

The project proposal is used to assess a student's essential writing skills relevant to their field. These skills include using discipline specific concepts and knowledge to justify their rationale and approach, writing with clarity and purpose by adopting a style, structure and design which meets the funder's requirements, and using persuasive language, communication and writing strategies to win support. Embedded into this task is a consultation in which students explain the feasibility of their idea and the overall structure of their project proposal, and followed by a peer-review task in which students review and give actionable feedback to their peers.

Project pitch in English

The project pitch is applied to assess a student's ability to deliver professional and persuasive presentations to an audience relevant to the engineering field. The assignment requires students to justify their project idea, and persuade the audience to take action. Students will need to speak with fluency, clarity and purpose, pitch ideas in a style and structure appropriate to the specific audience, engage the audience, and use persuasive language and communication strategies.

Assessment type	Intended readers/audience	Timing
1. Project proposal in English Each team writes a proposal of 2000-2500 words	ELC Fund Assessment Panel (including engineering experts)	Week 8
2. Project pitch in English Each individual delivers a 5-6 minute project pitch followed by a question-and-answer session.	ELC Fund Assessment Panel and competitors	Weeks 12-13

	Class contact:	

Student Study Effort Expected	Seminars	26 Hrs.
	Other student study effort:	
	Researching, planning and writing the project proposal Rehearsing the presentation	52 Hrs.
	Total student study effort:	78 Hrs.
Reading List and References	1. D. F. Beer, Ed., *Writing and Speaking in the Technology Professions: A practical guide*, 2nd ed. Hoboken, NJ: Wiley, 2003. 2. R. Johnson-Sheehan, *Writing Proposals,* 2nd ed. New York: Pearson/Longman, 2008. 3. S. Kuiper and D. Clippinger, *Contemporary Business Reports*, 5th ed. Mason, OH: South-Western, 2013. 4. M. H. Markel, *Practical Strategies for Technical Communication*, 2nd ed. New York: Bedford/St. Martin's, 2016. 5. D. C. Reep, *Technical Writing: Principles, strategies, and readings*, 8th ed. Boston: Pearson/Longman, 2011. 6. E. D. Zanders and L. Macleod, *Presentation Skills for Scientists: A practical guide*, 2nd ed. Cambridge: Cambridge University Press, 2018.	

Subject Description Form

Subject Code	ENG1004
Subject Title	Engineering Professionals in Society I
Credit Value	1
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	Through a series of seminars, this subject enables students to understand: 1. the features and career development opportunities of various engineering disciplines 2. the responsibilities and accountability of engineering professionals 3. the organizational activities of professional engineering institutions Furthermore, it will also: 4. Enthuse students about their major study in engineering as well as engage them in active, autonomous learning and deep understanding
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the role and impact of engineers in a variety of professional fields in addressing contemporary societal needs at local, national and global levels b. Identify the qualities and competences required to become a successful professional engineer and explain why they are important for professional work c. Reflect on their professional aspirations and develop a personal development plan for pursuing their career goals in Engineering
Subject Synopsis/ Indicative Syllabus	1. <u>Features and Career Development Opportunities of Various Disciplines in Engineering</u> Features and career development opportunities of the disciplines under the Engineering Faculty, namely: Aeronautical and Aviation Engineering, Biomedical Engineering, Electrical and Electronic Engineering, Industrial and Systems Engineering, and Mechanical Engineering 2. <u>Responsibilities and Accountability of Engineering Professionals</u> Responsibilities and accountability of the engineering professionals in social, political, legal, economic, safety and health, and environmental domains; professional ethics, the work of the Independent Commission Against Corruption (ICAC), the work of the Environmental Protection Department 3. <u>Professional Institutions</u> International engineering agreements and the organizational activities of professional engineering institutions, professional accreditation, qualifications and criteria of engineering professionals

Teaching/Learning Methodology

The subject will be offered in terms of a series of seminars conducted by representatives from academic departments in PolyU with invited guest speakers from professional institutions; HKSAR Government organisations such as the Independent Commission Against Corruption (ICAC) and Environmental Protection Department; experts/practitioners/alumni from the industry, etc. In each seminar, the speaker will introduce to students the various disciplines and the different topics listed in the section "Subject Synopsis/Indicative Syllabus" while addressing the three learning outcomes (a), (b) and (c). "Flipped Classroom" approach will be adopted to nurture active learning for students with emphasis in student engagement. An active learning classroom will compose of various activities, namely:

1. Pre-seminar reading, research, and quizzes,
2. In-seminar case study, discussions, Question and Answer,
3. Post-seminar reflection, reviewing, and quizzes

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% Weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Pre-seminar quizzes	20%	✓	✓	✓
2. Post-seminar quizzes	50%	✓	✓	✓
3. Case Study	30%	✓	✓	✓
Total	100%	✓	✓	✓

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

1. Pre-seminar quizzes can encourage students to engage in the "flipped classroom" mode of learning, whereby they prepare for the oncoming seminar by advance reading, and research for background information.
2. Post-seminar quizzes can encourage students to participate actively in the seminars and do extended reading and information search afterwards. They can also assess students' understanding about the various topics introduced in the seminars and hence their achievement of the intended learning outcomes.
3. One case study to be conducted by students can assess students' in-depth understanding about the various topics introduced in the seminars.

Pre-seminar and post-seminar quizzes assess foundational knowledge, measuring learning outcomes (a) and (b). To assess learning outcome (c), a case study evaluates students' ability to define their career aspirations and create a personal development plan, guiding their journey as professional engineers, researchers, engineering entrepreneurs, etc.

Student Study Effort Expected

Class contact:	
• Seminars (7 sessions, 5 x 2 + 2 x 1.5 hours)	13 Hrs.
Other student study efforts:	
• Pre-seminar reading and research for information	7 Hrs.
• Post-seminar extended reading, information search, case report writing, and other learning and teaching activities	19 Hrs.
Total student study efforts:	39 Hrs.

Reading List and References	**Reference Books & Articles** 1. Holbrook, J. Britt, (ed), *Ethics, science, technology, and engineering: a global resource*, Farmington Hills, Mich.: Gale, Cengage Learning, 2015 2. Alam, Firoz, *Engineering education : accreditation & graduate global mobility*, Leiden: CRC Press/Balkema, 2021 3. Video (PolyU Library), Engineering – solving problems through science, San Francisco, California, USA: Kanopy Streaming; 2014 **Online Materials**: 1. Faculty of Engineering website: https://www.polyu.edu.hk/en/feng/ 2. Departmental websites: a. https://www.polyu.edu.hk/en/aae/ b. https://www.polyu.edu.hk/en/bme/ c. https://www.polyu.edu.hk/en/eee/ d. https://www.polyu.edu.hk/en/ise/ e. https://www.polyu.edu.hk/en/me/ 3. HKIE Website: https://www.hkie.org.hk/en/ 4. Websites of professional societies and institutions, such as: a. The Chartered Institute of Logistics and Transport https://www.cilt.org.hk/en-US/Default.aspx b. CMI-HK Website: https://www.managers.org.uk/community/regional-networks/hong-kong/ 5. ICAC Website: https://www.icac.org.hk/en/home/index.html 6. Environmental Protection Department Website: https://www.epd.gov.hk/epd/english/top.html 7. TEDx Talks: Engineering for social impact: Randy Marsden at TEDx Edmonton, https://www.youtube.com/watch?v=UCDwNWSXFHk
Last Updated	May 2025
Prepared by	C.K. Choi

May 2025

Subject Description Form

Subject Code	ENG2001
Subject Title	Fundamentals of Materials Science and Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To realize the impact of the development of engineering materials on human civilization; 2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems. 3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in service performance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. comprehend the importance of materials in engineering and society; b. explain the properties and behaviour of materials using fundamental knowledge of materials science. c. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials; d. select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> Historical perspective; Evolution of engineering materials; Materials science and engineering; Classification of materials 2. <u>Atomic Structure and Structures of Materials</u> Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystalline and non-crystalline materials; Phase diagram and microstructure of alloys 3. <u>Electrical and Optical Properties of Materials</u> Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and photovoltaics; Light propagation in optical fibers; Liquid crystal; Photoelasticity

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

5. Introduction to Failure Analysis and Prevention
Fundamentals of fracture: ductile, brittle, fatigue and creep; Corrosion; Nondestructive testing; Techniques for failure analysis and prevention

6. Selection of Engineering Materials
Characteristics of metallic, polymeric, ceramic, electronic and composite materials; Economic, environmental and recycling issues

Teaching/Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d		
1. Assignments	15%	√	√	√	√		
2. Test	20%		√	√	√		
3. Laboratory report	5%		√	√			
3. Examination	60%		√	√	√		
Total	100 %						

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

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

The laboratory report is designed to assess the capability of students in analyzing and reporting experimental data relates to learning outcome (b).

The test and examination are for determining students' understanding of key concepts as well as for assessing their achievement of the learning outcomes.

	Class contact:	

Student Study Effort Expected	▪ Lectures, tutorials, practical	39Hrs.
	Other student study effort:	
	▪ Guided reading, assignments and reports	37Hrs.
	▪ Self-study and preparation for test and examination	47Hrs.
	Total student study effort	123Hrs.
Reading List and References	1. William D. Callister, Jr., David G. Rethwisch, *Fundamentals of materials science and engineering,* 4th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-53126-6 2. William D. Callister, Jr., David G. Rethwisch, *Materials Science and Engineering*, 8th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-37325-5 3. Materials World (Magazine of the Institute of Materials, Minerals and Mining)	

Revised (April 2014)

Subject Description Form

Subject Code	ENG2002
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	(i) To introduce the fundamental concepts of computer programming. (ii) To equip students with solid skills in Python programming. (iii) To equip students with techniques for developing structured and object-oriented computer programs. (iv) To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. Familiarize themselves with at least one Python programming environment. 2. Be proficient in using the basic constructs of Python to develop a computer program. 3. Develop a structured and well-documented computer program. 4. Understand the basics of object-oriented programming and use them to write computer programs. 5. Apply computer programming to solve practical engineering problems.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. **Introduction to Programming** Components of a computer; Data representation in computers; Programming environment; Python IDE; Editing, saving, and running a script; Process of application development. 2. **Bolts and Nuts of Python** Data types; Variables and constants; Operators, expressions, and statements; Basic syntax; Functions and modules; Scope of variables; Python modules; Absolute and relative import. 3. **Program Flow Control and Functions** Branching and looping; Iterators; Unicode; Python functions; static functions; Lambda function; Position arguments and default arguments; args and kwargs; Interface with command line; argparse. 4. **Program Design and Debugging** Structured program design; Testing and debugging a program; Exception and assertion. 5. **Strings and File I/O** String encoding format; F-string; String operations; String and number conversion; File and directory manipulations; The “os”, “sys”, and “shutil” modules; Reading/writing text and numbers from/to a file. 6. **Tuples, Lists, Dictionaries, and Sets** Basic tuple and list operations; Dictionary literals; Basic dictionary and sets operations; Built-in tuple/list/dictionary/set methods and functions; Use of enumerate and zip. 7. **Basic Object-Oriented Programming** Objects and classes; Attributes and methods; Inheritance and polymorphism; Special methods and operator overloading.

	8. **Data Analytics with Python Libraries** Introduction to NumPy, Pandas, and Matplotlib; NumPy arrays, built-in methods, and mathematical operations; Reading/writing data files using Pandas; Pandas operations and functions; Data visualization with Matplotlib.

Teaching/Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures, supplemented with short quizzes	2,3,4	Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using Python and apply the techniques of developing structured object-oriented applications.
Practical sessions/ Tutorials where problems are given to students for them to solve	1,2,3,4	Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finish the exercises, and interactive Q&A will take place.
Assignment, tests and final examination	1,2,3,4,5	By doing the assignment, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given Python applications and apply knowledge to solve problems. They will have to design solutions by evaluating different alternatives. To enhance the students' problem-solving skills in a given programming environment, open-book programming tests are arranged regularly. To assure students' understanding of fundamental concepts, a closed-book final examination is arranged.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended subject learning outcomes to be assessed				
		1	2	3	4	5
1. In-class exercises and homework	10%	✓	✓	✓	✓	
2. Quizzes	10%		✓	✓	✓	
3. Programming tests	30%	✓	✓	✓	✓	✓
4. Assignment	20%	✓	✓	✓	✓	✓

5. Final examination	30%	✓	✓	✓	✓	✓
Total	100%					

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

The quizzes are for assessing the understanding of fundamental concepts. The in-class exercises and homework are conducted to help students familiarize themselves with the programming language and skills. The programming tests are for assessing the ability of students to solve computer problems through programming within a specified period. Through doing assignments, students will be able to experience how to solve engineering problems and design solutions by using a systematic approach. The final examination is for assessing the students' ability to use the programming language and analyse computer programs.

Student Study Effort Expected		
	Class contact:	
	• Lectures, Tests and Quizzes	26 Hours
	• Practical sessions/Tutorial	13 Hours
	Other student study effort:	
	• Self-studying and assignments	57 Hours
	• Homework	12 Hours
	Total student study effort:	**108 Hours**

Reading List and References

Reference Books:

1. G. van Rossum and the Python development team, *Python Tutorial Release 3.10.0*, Nov. 2021.
2. C. Hill, *Learning Scientific Programming with Python*, (2nd ed.) Cambridge: Cambridge University Press, 2020.
3. C.P. Millike, *Python Projects for Beginners: a ten-week bootcamp approach to Python programming*. Berkeley, CA: Apress, 2020.

Online resources:

1. DataCamp online course https://app.datacamp.com/
2. https://www.w3schools.com/python/
3. https://www.online-python.com/

(revised) July 2025

Subject Description Form

Subject Code	ENG3004
Subject Title	Society and the Engineer
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject is designed for engineering students as a complementary subject on the role of the professional engineer in practice and their responsibilities toward the profession, colleagues, employers, clients, and the public. The objectives of the subject are to enable students to 1. appreciate the historical context of modern technology and the nature of the process whereby technology develops and the relationship between technology and the environment, as well as the implied social costs and benefits; 2. understand the social, political, legal, and economic responsibilities and accountability of the engineering profession and the organizational activities of professional engineering institutions; 3. be aware of the short-term and long-term effects related to safety and health, and the environmental impacts of technology; 4. observe professional conduct, as well as the legal and other applicable constraints, related to various engineering issues; and 5. develop a strong vision to optimize their contribution to sustainable development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify and evaluate the effects of technology as it applies to the social, cultural, economic, legal, health, safety, and environmental dimensions of society; b. explain the importance of local and international professional training, professional conduct and ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; c. evaluate and estimate, in a team setting, the impact of contemporary issues, planned projects, and unforeseen technological advances related to engineers; effectively communicate and present the findings to laymen and peers.
Subject Synopsis/ Indicative Syllabus	1. <u>Impact of Technology on Society</u> Historical cases and trends of technological innovation explored through their impact on social and cultural developments of civilization and their commonalities.

	2. Environmental Protection and Related Issues Roles of the engineer in energy conservation, ecological balance, and sustainable development. 3. Global Outlook for Hong Kong's Economy and Industries Support organizations, policies and their impacts on industrial and economic development in Greater China, the Pacific Rim, and the world. 4. Regulatory Organizations and Compliance Discussion of engineer's responsibilities within different regulatory frameworks and environments; Examples from various entities such as the Labor Department and the Occupational Health and Safety Council; Legal dimensions to engineering such as liability, contract law, and industrial legislation. 5. Professional Institutions Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers. 6. Professional Ethics Prevention of bribery and corruption; The work of the Independent Commission Against Corruption (ICAC); Social responsibilities of engineers.
Teaching/Learning Methodology	Class comprises short lectures to provide essential knowledge and information on the relationships between society and the engineer under a range of dimensions. Other methods include in-class discussions, case studies, and seminars to develop students' in-depth analysis of the relationships. Each student will submit two assignments based on their weekly learning activities, which will be part of the subject's evaluation. The assignments will deal with important issues of social, cultural, economic, legal, health, safety, and environmental dimensions of society. Students are assembled into groups; throughout the course, they will work on engineering cases by completing the following learning activities: 1. Case analysis where students explore the relationships between society and the engineering issues of a project under specific dimensions; 2. Construction and assembly of a case portfolio which includes i. Presentation slides ii. Feedback critiques iii. Individual Reflections 3. Final oral presentation

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Continuous assessment	70%			
• Group weekly learning activities	(20%)	✓	✓	✓
• Individual Assignments (2)	(20%)	✓	✓	
• Individual final presentation	(15%)	✓	✓	
• Individual reflection statement	(5%)	✓	✓	
• Group project	(10%)	✓	✓	✓
2. Take-home Assignment	30%	✓	✓	
Total	100%			

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

The coursework requires students to work in groups to study cases from the perspectives of the eight dimensions in an engineering setting. Based on these exercises, students' ability to apply and synthesize acquired knowledge can be assessed through their performance during groups' discussion, oral presentations, and the quality of their portfolio reports on the case studies.

The take-home assignment is used to assess students' critical thinking and problem-solving skills when working on their own and give students more time and flexibility to complete an assignment. It provides students the opportunity to review and extend what they have learnt in class and to check their understanding and progress.

Student Study Effort Expected		
	Class contact:	
	▪ Lectures and review	27 Hrs.
	▪ Presentation	12 Hrs.
	Other student study efforts:	
	▪ Research and preparation	55 Hrs.
	▪ Report and Assignments writing	25 Hrs.
	Total student study effort	119 Hrs.

Reading List and References	**Reference Books & Articles:** 1. Education for Sustainable Development - An Expert Review of Processes and Learning, UNESCO, 2011 2. Poel, Ibo van de, and Lambèr M. M. Royakkers. Ethics, Technology, and Engineering : an Introduction. Wiley-Blackwell, 2011 3. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010 4. Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, 2005 5. Securing the future: delivering UK sustainable development strategy, 2005 6. Johnston, F S, Gostelow, J P, and King, W J, 2000, *Engineering and Society Challenges of Professional Practice*, Upper Saddle River, N.J.: Prentice Hall 7. Hjorth, L, Eichler, B, and Khan, A, 2003, *Technology and Society A Bridge to the 21st Century*, Upper Saddle River, N.J.:Prentice Hall 8. The Council for Sustainable Development in Hong Kong, http://www.enb.gov.hk/en/susdev/council/ 9. Poverty alleviation: the role of the engineer, http://publications.arup.com/publications/p/poverty_alleviation_the_role_of_the_engineer **Reading materials:** Engineering journals: - Engineers by The Hong Kong Institution of Engineers - Engineering and Technology by The Institution of Engineers and Technology Magazines: Time, Far East Economic Review Current newspapers: South China Morning Post, China Daily, Ming Pao Daily

(revised) June 2021

Subject Description Form

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

Teaching/Learning Methodology

A mixture of lectures, tutorial exercises, case studies, and laboratory work are used to deliver the various topics in this subject. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students' "learning to learn" ability. Some case studies are from best practices of projects, based on a literature review. They are used to integrate the topics and demonstrate to students how the various techniques are interrelated and applied in real-life situations.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Tutorial exercises/ written report	10%	✓	✓	✓	✓
2. Oral presentation	10%	✓	✓	✓	✓
3. End Term Test	20%	✓	✓	✓	✓
4. Written examination	60%		✓	✓	
Total	100%				

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

Continuous assessment (1), (2), and (3): Test, written reports, oral presentation, and tutorial exercises are used to assess students' understanding and application of the knowledge that they have learnt relative to learning outcomes (a), (b), (c) and (d).

Written examination: questions are designed to assess learning outcomes (b) and (c).

Student Study Effort Expected

Class contact:	
▪ Lectures 3 hours/week for 9 weeks	27 Hrs.
▪ Tutorials / Case studies 3 hours/week for 4 weeks	12 Hrs.
	39 Hrs.
Other student study effort:	
▪ Preparation for assignments, short tests, and the written examination	79 Hrs.
Total student study effort	118 Hrs.

Reading List and References

1. Meredith, J. R., Shafer, S. M., Mantel Jr, S. J., 2017, *Project Management: a Strategic Managerial Approach*. John Wiley & Sons.
2. Pinto, J. K., 2020. *Project Management: Achieving Competitive Advantage*. Pearson.
3. Kerzner, H. 2017, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling,* John Wiley & Sons.

	4. Project Management Institute, 2013, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide),* Fifth Edition. 5. Smith, NJ (ed.) 2008. *Engineering Project Management*, Blackwell, Oxford

(Revised) June 2024

Intended Blank

Industrial Centre (IC) Training

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	AAE2103/IC2177
Subject Title	Applied Engineering Fundamentals
Credit Value	2 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers fundamental engineering techniques to students, project-based learning approach will be adopted in this subject aiming to enhance the problem-solving skills for all Year 1 students in the Engineering Faculty.
Intended Learning Outcomes	Upon completion of the subject, students will: a) Be able to demonstrate an understanding of engineering design b) Develop their problem-solving ability and global outlook c) Be able to demonstrate an understanding on typical engineering material properties and basic prototyping and joining processes
Subject Synopsis/ Indicative Syllabus	1. Engineering Design and Prototyping Processes Engineering design concept, prototyping for design verification, digital modelling, measurement techniques, standard components. Basic Prototyping techniques; 3D Printing, Laser Cutting and standard components. Engineering material; polymers, metal, composite, surface treatment processes; painting, plating. Application of adhesives and mechanical parts in joint of material. 2. Fundamental Engineering Projects There will be practical workshops, project briefing and demonstration sessions for the project which aim at developing students' creativity and problem-solving skills through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems.
Teaching/ Learning Methodology	**Mini Lectures** The Mini lectures are aimed at providing students the basic knowledge and concept about engineering design and the common processing technique for prototyping and design verification **Workshop Tutorials** The workshop tutorials focus on deepening students' knowledge and enhancing their ability to apply concepts and skills to complete specific tasks. The practical works aim to reinforce learning by enabling students to explore the diverse topics covered in the course through active engagement in research, practice, questioning, and problem-solving in an integrated and hands-on manner.

<table>
<tr><td></td><td><u>Fundamental Engineering Project</u>
For the fundamental engineering project, students will be required to design and develop an engineering solution to a given problem under the guidance of instructors. Students will be given opportunities to develop creativity, problem-solving skills and research for information from this project.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes
(Note 4)</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Assignments</td><td>80</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Quizzes</td><td>20</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="3"></td></tr>
</table>
Assignments are designed to enable students to periodically reflect upon and apply the knowledge acquired throughout the training. Quizzes are designed to facilitate students to review the breadth and depth of their understanding on specific topics.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class Contact</td><td></td></tr>
<tr><td>▪ Mini lecture, In-class Assignments and project works</td><td>60 Hrs.</td></tr>
<tr><td>Other Student Study Effort</td><td>0 Hrs.</td></tr>
<tr><td>Total Student Study Effort</td><td>60 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>1) Training material, manual and articles published by Industrial Centre.
2) “Engineering fundamentals & problem solving” (2012) A. R. Eide, New York, NY: McGraw-Hill</td></tr>
</table>

Subject Description Form

Subject Code	AAE3102/IC380
Subject Title	Integrated Aviation Engineering Project
Credit Value	4 Training Credits
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims at developing students' understanding on the principles and operations of common aircraft manufacturing process. Through undertaking hands-on projects, students will also be able to integrate their academic knowledge with practical skills about key engineering stages including: project planning, machining, assembly, testing and evaluation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Demonstrate a practical understanding on the working principle, capability and operation of major aircraft manufacturing processes; b) Select and use appropriate materials and manufacturing processes for specific parts requirements; c) Work collaboratively and effectively to execute key stages of a manufacturing projects; and d) Show a commitment to quality, timeliness, regulation conformance, and continuous improvement.
Subject Synopsis/ Indicative Syllabus	<u>Digital machining</u> • Materials and manufacturing of common aircraft engine parts; • Working principle and operation of metal removal processes including turning, milling, drilling; • Practical appreciation of precision multi-axis machining and coordinate measurement; <u>Sheet-metal fabrication</u> • Materials and constructions of common metal airframe structures; • Working principle and operation of sheet-metal fabrication processes including bending, drilling, riveting; • Practical appreciation of damage removal and bolted repair techniques. <u>Fiber composites fabrication</u>

Subject Description Form

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

- Materials and constructions of common fiber composites airframe components;
- Working principle and operation of composites fabrication processes including wet-layup, pre-preg layup, autoclave curing;
- Practical appreciation of damage removal and bonded repair techniques.

Aviation inspection

- Methods and practices of destructive test and non-destructive test;
- Working principle and operation of material characterization and damage detection technologies;
- Practical appreciation of common material testing techniques including Tensile test and Compressive test, and damage detection techniques including Penetrant test and Eddy Current test.

</td></tr>
<tr><td>Learning Methodology</td><td>

Group-based integrative-project will be used to enable students to integrate practical skill sets through fabricating and optimising physical products. Examples of physical products are: Airframe structures, cabin installations, aircraft maintenance tools, jigs and gauges, *etc*.

Workshop-based hands-on activities will be used for students to appreciate the principles and operations of common aircraft manufacturing technologies, and to acquire essential practical skills for them to carry out project tasks. Short lectures, demonstrations, and tutorials will be mixed with hands-on activities to deliver technical contents.

The project fabrication work and hands-on practices will be scheduled to intertwine to facilitate reflective observation.

Technical handouts will be available on-line for students to familiarise with the technical contents before lesson.

</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

<table>
<tr><th rowspan="2">Assessment Methods</th><th rowspan="2">Weighting (%)</th><th colspan="4">Intended Learning Outcomes Assessed</th></tr>
<tr><th>a</th><th>b</th><th>c</th><th>d</th></tr>
<tr><td>1. Workshop assignments</td><td>60</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>2. Quizzes</td><td>20</td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>3. Training report</td><td>20</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Total</td><td>100</td><td colspan="4"></td></tr>
</table>

Workshop assignments in the form of small group manufacturing tasks will be used to assess how well students understand the working principle, capabilities, and operation of the manufacturing processes. Students' skill-level will be

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

Subject Description Form

	evaluated by the artifacts they produced, while their engineering judgment and critical thinking be evaluated by individually filled task worksheets. Multiple-choice quizzes will be used to assess broadly the students' understanding of declarative knowledge covered by the subject. Individual training report will be used to assess holistically how well the students consolidate technical contents, reflect on their engineering decisions, and critically review their team-working. The students also elaborate on their professional attitude and commitment in their writing.	
Student Study Effort Expected	**Class Contact**	
	▪ Hands-on practice	48 Hrs.
	▪ Project	72 Hrs.
	Other Study Effort	0 Hrs.
	Total Study Effort	**120 Hrs.**
Reading List and References	Reference Standards and Handbooks: 1. Forenz, T. (2020) Aviation maintenance technician certification series, Materials and Hardware: Module 6 (B2). Tabernash, CO, USA: Aircraft Technical Book Company. 2. Forenz, T. (2020) Aviation maintenance technician certification series, Maintenance Practices: Module 7A (B2). Tabernash, CO, USA: Aircraft Technical Book Company.	

Intended Blank

Major - Elective Subjects

Subject Description Form

Subject Code	AAE4009
Subject Title	Data Science and Data-driven Optimisation in Airline and Airport Operations
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE3009 Operations Research and Computational Analytics in Air Transport Operations
Objectives	This subject will provide students with 1. A conceptual and practical foundation in airport and airline operations for knowledge representation and reasoning of artificial intelligence, data mining, soft computing and optimisation methods as problem solving tools; and 2. Research methodology, data interpretation and analytical skills in regard to real-life data and case scenarios of airport and airline operations; and 3. Experience of conducting proper research experiments and engineering reports for results dissemination.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify and formulate the data-driven engineering problems in airport and airline operations; and b. Transfer the expert knowledge into knowledge-based system and algorithms via machine learning approaches; and c. Plan, design and develop appropriate algorithms via soft computing methods and analysis the data and the solution quality with alternatives; and d. Review the performance and make judgements based on numerical results and provide off-the-shelf suggestions, profitable solutions and actionable managerial insights.
Subject Synopsis/ Indicative Syllabus	Lectures are used to deliver the fundamental knowledge in relation to various aspects of machine learning, data mining, data analytics, data-driven optimisation and artificial intelligence in airline and airport operations (outcomes a to d). Several laboratories will be made available to equip students with the basic knowledge of data mining, soft computing, optimisation and artificial intelligence in solving aviation engineering problems (outcomes a to c). Given the basic knowledge of data science, a group mini project will be used to help students deepen their knowledge of a specific topic through literature study, methodology study, analysis of data, dissemination of research findings and report writing (outcomes a to d).

	The subject covers the following topics. **Machine learning, data mining and artificial intelligence -** The topics include the following elements: • Supervise and unsupervised learning approach. • Descriptive methods, including clustering, association. • Predictive methods, including classification and regression. • Supervised learning algorithms: Nearest neighbour algorithm, fuzzy logic, gaussian mixture, neural network, linear regression, logistic regression, decision trees, Naïve Bayes, genetic algorithms • Unsupervised learning algorithms: associate rules, principal component analysis, gaussian mixture **Data-driven optimisation -** The topics include the following elements: • Basic mathematical formulation and modelling, convex optimisation, data-driven modelling, airline scheduling planning, crew rostering, runway scheduling, gate assignment problem, air logistics transportation problem **Optimisation methods and soft computing -** The topics include the following elements: • Branch and Bound algorithm, heuristics, meta-heuristics, swarm intelligence
Teaching/Learning Methodology	Teaching is conducted through class lectures, case studies, and laboratory exercises. The basic knowledge, research methodology and theoretical models will be introduced. The understanding of how to address and formulate problems by using mathematical programming, artificial intelligence algorithms, and soft computing techniques with modern programming language is emphasised. Research methodology, data analytics skills, algorithm design skills and programme methods are taught in class as well as the related real-life scenarios using data to enhance their research abilities. Laboratory exercises, mini reports, oral disseminations and test are used to make up the course work marks.
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. Laboratory	40%	✓	✓	✓	✓
2. Mini report	20%			✓	✓
3. Oral presentation	10%			✓	✓
4. Test	30%	✓	✓	✓	✓
Total	100 %				

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

Overall assessment:

1.0 x continuous assessment

The continuous assessment (100%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via several laboratory teaching and laboratory report, numerical analysis, reading assignment. In particular, mini projects are used to assess the students' capacities of self-study and problem-solving and effective communication skills in English so as to fulfil the requirements of working in the aviation industry. Test will be conducted to evaluate the students performance in mathematical problem formulation and algorithm design for a given airport and airline engineering problem with a limited examination time.</td></tr>
<tr><td rowspan="8">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/seminar</td><td>24 Hrs.</td></tr>
<tr><td>▪ Laboratory</td><td>15 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Literature review / Scientific finding and analysis / final report writing preparation / presentation material preparation</td><td>36 Hrs.</td></tr>
<tr><td>▪ Self-study / preparation</td><td>36 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>111 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">1. Barber, D. (2012). Bayesian reasoning and machine learning. Cambridge University Press.

2. Boyd, S., Boyd, S. P., & Vandenberghe, L. (2004). Convex optimization: Cambridge university press.

3. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to algorithms: MIT press.

4. De Neufville, R., & Odoni, A. (2003). Airport systems. planning, design and management. New York: McGraw-Hill.

5. Guido, S., & Müller, A. (2016). Introduction to machine learning with python (Vol. 282). O'Reilly Media.

6. Marsland, S. (2015). Machine learning: an algorithmic perspective. CRC press.

7. Richert, W. (2013). Building machine learning systems with Python. Packt Publishing Ltd.

8. Wallwork, A. (2016). English for writing research papers: Springer.</td></tr>
</table>

	9. Wells, A. T. (2007). Air transportation: A management perspective: Ashgate Publishing, Ltd. 10. Wu, C.-L. (2016). Airline operations and delay management: insights from airline economics, networks and strategic schedule planning: Routledge.

Revised in January 2022

Subject Description Form

Subject Code	AAE4011
Subject Title	Artificial Intelligence in Unmanned Autonomous Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE2003 Introduction to Aircraft Systems
Objectives	This subject will provide students with 1. The main concepts, ideas, and techniques of advanced artificial intelligence (AI) in unmanned autonomous systems, e.g. unmanned aerial vehicles (UAV), unmanned ground vehicles (UGV); 2. The major components of typical unmanned autonomous systems fulfilling a certain function, such as environment inspection using UAVs; and 3. Expansive view into the technological trend of AI and its application in unmanned autonomous systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply AI algorithms or adopt AI tools in solving engineering problems in unmanned autonomous systems; b. Understand the relationship between multiple functions of unmanned autonomous systems, including perception, path planning, decision making, and control; c. Design partial of the functions of typical unmanned autonomous systems, such as positioning, and path planning; and d. Improve the existing AI algorithms to specific unmanned autonomous systems applications.
Subject Synopsis/ Indicative Syllabus	**Introduction to Artificial Intelligence**: The topic mainly includes the basic knowledge of machine learning such as conventional classification and regression together with high-level AI, such as convolutional neural network (CNN) for image segmentation. **Introduction to Unmanned Autonomous Systems**: The topic mainly includes the major existing applications of unmanned autonomous systems, such as UAV and UGV. Meanwhile, the topic will include the basic knowledge of typical unmanned autonomous systems. **Optimisation Algorithm to Unmanned Autonomous Systems**: The topic mainly includes the optimisation algorithms such as Gauss-Newton used to solve the engineering problems related to unmanned autonomous systems. **Sensors for Unmanned Autonomous Systems**: The topic mainly introduces the typical sensors applicable to unmanned autonomous systems. The sensors include the light detection and ranging (LiDAR), inertial measurement unit (IMU), and camera. Basic algorithms for sensors-based positioning will be introduced.

<table>
<tr><td></td><td><u>Navigation for Unmanned Autonomous Systems</u>: The topic mainly include positioning and navigation for the unmanned autonomous system using simultaneous localisation and mapping (SLAM) using LiDAR sensors together with point cloud processing, registration,

<u>AI-aided Navigation for Unmanned Autonomous Systems</u>: The topic mainly includes the application of AI in LiDAR SLAM using object detection in unmanned autonomous systems.

<u>Case Study (mini-group projects)</u>: A design project will be carried out for students to learn the deployment of AI in unmanned autonomous systems through practice.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Teaching is conducted through lectures and case studies (mini-group projects). Lectures are used to deliver advanced knowledge concerning various aspects of AI, data analysis, and its applications in unmanned autonomous systems The basic knowledge, research methodology, and theoretical models will be introduced. Case study will provide the understanding of how to address and formulate problems by using mathematical programming, artificial intelligence algorithms, and optimisation techniques in unmanned autonomous systems.

Research methodology, data analytics skills, and algorithm design skills are taught in class as well as the related real-life scenarios using data to enhance their research abilities.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes to be covered</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. Case Study</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
</table>
</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Homework assignment</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Mini-group project</td><td>15%</td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>3. Test</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>4. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
</td></tr>
</table>

	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 examination is adopted to assess students on the overall understanding and the ability to apply the concepts. It is supplemented by continuous assessment including assignments, closed-book tests, and mini-group projects. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. In particular, a group mini-project is used to assess the students' capacities of self-learning and problem-solving, and effective communication skills in English to fulfill the requirements of being aircraft design engineers.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Case Study	6 Hrs.
	Other student study effort:	
	▪ Literature review / case study / reading	36 Hrs.
	▪ Self-study / preparation	36 Hrs.
	The total student study effort	111 Hrs.
Reading List and References	1. Guido, S., & Müller, A. (2016). Introduction to machine learning with python (Vol. 282). O'Reilly Media. 2. Marsland, S. (2015). Machine learning: an algorithmic perspective. CRC press. 3. Zhang, Tao, Qing Li, Chang-shui Zhang, Hua-wei Liang, Ping Li, Tian-miao Wang, Shuo Li, Yun-long Zhu, and Cheng Wu. "Current trends in the development of intelligent unmanned autonomous systems." Frontiers of information technology & electronic engineering 18, no. 1 (2017): 68-85. 4. Barfoot, Timothy D. State estimation for robotics. Cambridge University Press, 2017. 5. Thrun, S. (2002). Probabilistic robotics. Communications of the ACM, 45(3), 52-57.	

Mar 2023

Subject Description Form

Subject Code	AAE4013
Subject Title	Aviation Logistics and Supply Chain Informatics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE2004 Introduction to Aviation System and Air Transport Regulation
Objectives	This subject will provide students with 1. The advanced supply chain operations and management in air logistics; 2. The regulation, logistics flow and distribution methods of air cargo, freight forwarding and intra-modal transportation; and 3. The emerging wireless sensing technologies improving the transparency of air logistics operations.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design and develop suitable mathematical model for air logistics and supply chain operations; b. Design and develop solutions following the regulations by local authorities and international standard (IATA-suggested regulations and solutions); c. Illustrate, interpret, and analyse the mode of air transport, cargo route profitability, perishable live animals and non-perishable cargo logistics operations and management; and d. Deduce the best solution and its outcome according to the planned cargo business strategy.
Subject Synopsis/ Indicative Syllabus	**Cargo operations -** Regulations and international standard on cargo operations; Cargo accident investigation and prevention; Cargo, apron, and warehouse operations; Dangerous goods regulations for general cargo; International air law. **Air logistics and supply chain informatics -** Air logistics, supply chain operations and management; Wireless sensing technologies and temperature sensitive cargo operations; Aviation logistics business intelligence and competition analysis **Route profitability -** Profitability and route analysis; Tonnes kilometre; Cargo yield. **Transportation analytics -** Intra-modal transportation and transportation modelling; Air cargo competitor analysis and market research.

Teaching/Learning Methodology

Teaching is conducted through class lectures and case study. The basic knowledge, research methodology and theoretical models will be introduced. The understanding of how to address and formulate problems by using mathematical programming and optimisation techniques with modern programming language is emphasised. Case studies and analysis are taught in class as well as the related real-life scenarios using data to enhance their research abilities.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Case studies	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment	20%	✓	✓	✓	✓
2. Test	30%	✓	✓	✓	✓
3. Final 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 (50%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via several assignments and mid-term examination. The final examination assessment (50%) will also be considered to assess the students learning outcome.

Student Study Effort Expected	Class contact:	
	▪ Lecture / Case Studies	39 Hrs.
	Other student study effort:	
	▪ Self-study / preparation	36 Hrs.
	▪ Assignments	36 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	1. Ashford, N. J., Stanton, H. M., Moore, C. A., Pierre Coutu, A. A. E., & Beasley, J. R. (2013). Airport operations. McGraw-Hill Education. 2. Abdelghany, A., & Abdelghany, K. (2016). Modeling applications in the airline industry. Routledge. 3. Frazelle, E. (2002). Supply chain strategy: the logistics of supply chain management. MCGraw-Hill Education. 4. Hillier, F. S. (2012). Introduction to operations research. Tata McGraw-Hill Education. 5. Michael, L. P. (2018). Scheduling: theory, algorithms, and systems. Springer.	

December 2021

Subject Description Form

Subject Code	AAE4015
Subject Title	Advanced Accident and Hazards Analysis with Big Data in Aviation
Credit Value	4
Level	3
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE4903 Human Factors in Aviation
Objectives	This subject will provide students with 1. An overview understanding of hazard recognition, accident prevention, and accident investigation; 2. The fundamental knowledge and skills to conduct a general air traffic accident investigation; and 3. Up-to-date case studies together with practical methods for accident analysis in aviation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the progress of an effective accident investigation; b. Analyse the contributing factors to accidents via advanced big data analytics techniques; c. Evaluate the different causal factors that contribute to accidents and their potential effects; and d. Design appropriate interventions/ recommendation to improve aviation safety.
Subject Synopsis/ Indicative Syllabus	**Accident response and management** – Aviation safety culture; Accident notification processes; Health and safety at the accident site; Aviation accident pathology. **Accident investigation** – Systematic approach to investigation; Collection of evidence; Data recorder and their analysis; Aviation accident photography; Hazards management on site; Investigative interview techniques. **Accident analysis** – Human factors in accidents; Fundamental analysis and advanced analytical approaches, such as machine learning and data mining; Developing safety recommendation. **Hazard analysis** – Hazard analysis methods; Effects of hazard. Hazard control.

Teaching/Learning Methodology

Teaching is conducted through class lectures. The basic knowledge, analytic methods, and theoretical frameworks will be introduced. The understanding of how to address and formulate problems by using classical accident analysis methods, data mining techniques, public accident reports is emphasised. Case studies and analysis are taught in class as well as the related real-life scenarios using data to enhance their research abilities. Assignment, mid-term examination and final examination are used to make up the course work marks.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Case Study	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignment	20%		✓	✓	✓
2. Test	30%	✓	✓	✓	
3. Final 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 (50%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via several assignments and mid-term examination. The final examination assessment (50%) will also be considered to assess the students learning outcome.

Student Study Effort Expected	Class contact:	
	▪ Lecture / Case Study	39 Hrs.
	Other student study effort:	
	▪ Self-study / preparation	36 Hrs.
	▪ Assignments	36 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	1. Accident Investigation Techniques, Jeffrey S. Oakley. Published by: The American Society of Safety Engineers. ISBN: 1-885581-47-5 2. A Human Error Approach to Aviation Accident Analysis: The Human Factors Analysis and Classification System (1st ed.). Wiegmann, D.A., & Shappell, S.A. (2003). Routledge. ISBN: 9781315263878. 3. Handbook of Aircraft Accident Notification, Investigation and Reporting, https://www.carc.jo/en/content/131-aircraft-accident-investigation-manual 4. Aircraft Accident Investigation, Richard Wood, Robert Sweginnis, Endeavor Books; 2nd edition (April 24, 2006). ISBN-13: 978-1892944177	

December 2021

Subject Description Form

Subject Code	AAE4105
Subject Title	Engineering Composites
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE3002 Aircraft Structures and Materials
Objectives	1. To provide students with knowledge of mechanical behavior of composite materials used in aircraft; and 2. To provide students with understanding of the processing, fabrication and influence of fabrication and environment on properties of aircraft composites; and 3. To gain appreciation of the wide design flexibility that composites can afford.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate a good understanding of types and properties of composites used in aircraft; b. Possess knowledge in processing and fabrication of structural composites; c. Understand mechanical behaviors of aircraft composite materials; d. Analyse composite laminates using classic laminate theory and apply failure criteria to assess composite structures subject to various types of loading.
Subject Synopsis/ Indicative Syllabus	***Introduction to Composites*** - Classification and characteristics of composite materials in aircraft. Mechanical behavior of composite materials. Reinforcements. Matrix materials. Green composites ***Composite Interfaces*** - Fibre-matrix interfaces. Interfacial properties. Stress transfer through composite interfaces. ***Lamina Stress-strain Relationships*** - Lamina and laminate theories. Transformation and prediction of elastic parameters. Load-deformation relationship. ***Analysis of Continuous Fibre-Reinforced Lamina and Laminates*** - Macromechanical behaviour of a lamina. Macromechanical behaviour of a laminate. ***Processing and Fabrication*** - Structural composites and their processing technology. Manufacture of laminated fibre-reinforced composite materials. Influence of fabrication and environment on properties. ***Failures, Design, and Applications of Composites*** - Failure theories. Design

optimisation. Engineering applications of composites.

Non-Destructive Testing Techniques for Composites – Visual testing, ultrasonic testing, thermography, radiographic testing, electromagnetic testing, acoustic emission, new trends in structural health monitoring strategies.

Laboratory Experiments

Typical experiments:

1. Manufacturing of composites
2. Tensile test of composites
3. Inspection of composites
4. Repair of a composite structure

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to advanced composite materials (outcomes a to d).

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

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

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓
Experiment	✓	✓		

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

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

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

	Overall Assessment: 0.6 × End of Subject Examination + 0.4 × Continuous Assessment Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, assignments and laboratory reports which provide timely feedbacks to both lecturers and students on various topics of the syllabus.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Laboratory	6 Hrs.
	Other student study effort:	
	▪ Self Study	45 Hrs.
	▪ Case study report preparation and presentation	21 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. Ronald F. Gibson, Principles of Composite Material Mechanics, McGraw-Hill International Editions, latest edition. 2. C.T. Sun, Mechanics of Aircraft Structures, John Wiley & Sons, latest edition. 3. Celine A. Mahieux, Environmental Degradation in Industrial Composites, Elsevier, latest edition. 4. A. Brent Strong, Fundamentals of Composites Manufacturing-Materials, Methods and Applications, Society of Manufacturing Engineers, latest edition.	

December 2019

Subject Description Form

Subject Code	AAE4107
Subject Title	Aircraft Gas Turbine Engine Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE2102/IC2133 Aircraft Manufacturing and Maintenance Fundamentals
Objectives	To provide students with knowledge of aircraft gas turbine engine systems and application in engine monitoring and maintenance
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire good understanding of aircraft turbine engine design and construction. b. Demonstrate good understanding of compressor stall/surge and its prevention. c. Apply their knowledge and skills to explain the limitations of aircraft gas turbine engines under normal and abnormal operational conditions.
Subject Synopsis/ Indicative Syllabus	**Basic Aircraft Turbine Engine Design and Construction** Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop. **Compressor stall/surge** Causes and effects of compressor stall and surge and its prevention. **Bearings and Seal** Constructional features and principles of operation. **Lubricants and Fuel** Properties and specifications; Fuel additives; Safety precautions. **Lubrication Systems** System operation/lay-out and components. **Fuel Systems** Operation of engine control and fuel metering systems including electronic engine control (FADEC); systems lay-out and components. **Air Systems**

	Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services. **Starting and Ignition Systems** Operation of engine start systems and components; ignition systems and components; maintenance safety requirements **Engine Indication Systems** Exhaust gas temperature / interstage turbine temperature; engine thrust indication: engine pressure ratio, engine turbine discharge pressure or jet pipe pressure systems; oil pressure and temperature; fuel pressure and flow; engine speed; vibration measurement and indication; torque; power. **Power Augmentation Systems** Operation and applications; water injection, water methanol; afterburner systems. **Turbo-prop Engines** Gas coupled/free turbine and gear coupled turbines; reduction gears; integrated engine and propeller controls; overspeed safety devices. **Turbo-shaft engines** Arrangements, drive systems, reduction gearing, couplings, control systems. **Auxiliary power units (APUs)** Purpose, operation, protective systems. **Powerplant Installation** Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains. **Engine Monitoring and Ground Operation** Procedures for starting and ground run-up; interpretation of engine power output and parameters; trend (including oil analysis, vibration and boroscope) monitoring; inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; compressor washing/cleaning; foreign object damage. **Engine Storage and Preservation** Preservation and depreservation for the engine and accessories / systems.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to aircraft gas turbine engines (outcomes a to c).

Tutorials are used to illustrate the applications of fundamental knowledge to practical situations (outcomes a to c).

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments / Quizzes	50%	✓	✓	✓
2. Final 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

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 quizzes. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lectures	36 Hrs.
▪ Tutorials	3 Hrs.
Other student study effort:	
▪ Assignments	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	**105 Hrs.**

Reading List and References	1. EASA Module 15 Gas Turbine Engine, Aircraft Technical Book Co. 4th Edition 2. The Jet Engine, Rolls Royce, Latest Edition 3. Mattingly, J.D., Boyer, K.M., von Ohain, H., Elements of Propulsion: Gas Turbines and Rockets, AIAA, 2016. 4. Aircraft Powerplants, Bent & McKinley, McGraw-Hill, 4th Edition 5. Aircraft Gas Turbine engine Technology, Irwin E Tregar, McGraw-Hill, 2nd Edition 6. Thrust for flight, Thomson, W. (William), Longman, 2nd Edition 7. Aircraft powerplants., Kroes, Michael J.; Thomas W. Wild, McGraw-Hill, Ninth Edition. 8. Aero engine combustor casing : experimental design and fatigue studies, Panigrahi, Shashi Kanta; Niranjan Sarangi, Boca Raton, 2017 9. Axial Turbine Aerodynamics for Aero-Engines: Flow Analysis and Aerodynamics Design, Zou, Zhengping ; Wang, Songtao ; Liu, Huoxing ; Zhang, Weihao, Springer Singapore, 2018

Revised in July 2022

Subject Description Form

Subject Code	AAE4108
Subject Title	Aircraft Inspection and Testing
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requiste:** AAE2102/ IC2133 Aircraft Manufacturing and Maintenance Fundamentals
Objectives	To provide students with knowledge of aircraft inspection and application in modern aircraft maintenance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire good understanding of aircraft inspection and repair techniques; and b. Demonstrate good understanding of inspecting fundamental aircraft components, including mechanics and avionics; and c. Apply their knowledge to handle aircraft material.
Subject Synopsis/ Indicative Syllabus	**Disassembly, Inspection, Repair and Assembly Techniques** - Types of defects and visual inspection techniques; Corrosion removal, assessment and reprotection. general repair methods, structural repair manual; Ageing, fatigue and corrosion control programmes. Non-destructive inspection techniques including: penetrant, radiographic, eddy current, ultrasonic and boroscope methods. Disassembly and re—assembly techniques. Trouble shooting techniques. **Abnormal Events** - Inspections following lightning strikes and HIRF penetration. Inspections following abnormal events such as heavy landings and flight through turbulence. **Electrical Wiring Interconnection System (EWIS)** - Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance; Wiring protection techniques: cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding; EWIS installations, inspection, repair, maintenance and cleanliness standards. **Riveting** - Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints. **Springs** - Types of springs, materials, characteristics and applications; Inspection and testing of springs. **Bearings** - Purpose of bearings, loads, material, construction; Types of bearings and their application; Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. **Transmissions** - Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns;

	Belts and pulleys, chains and sprockets; inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems. **Control Cables** - Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems; Swaging of end fittings; Inspection and testing of control cables; Bowden cables; Aircraft flexible control systems. **Material handling** - Sheet metal: marking out and calculation of bend allowance; sheet metal working, including bending and forming; Inspection of sheet metal work; Composite and non-metallic: Bonding practices; Environmental conditions; Inspection methods. **Welding, Brazing, Soldering and Bonding** - Soldering methods; Inspection of soldered joints. Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.
Teaching/Learning Methodology	Lectures are used to deliver the fundamental knowledge in relation to aircraft inspection and testing (outcomes a to c). Tutorials are used to illustrate the applications of fundamental knowledge to practical situations (outcomes a to c).

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments / Quizzes	50%	✓	✓	✓
2. Final 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

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 quizzes. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials	13 Hrs.
	Other student study effort:	
	▪ Assignments	20 Hrs.
	▪ Self-study	46 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. "EASA Module 6 B1 Materials and Hardware" by Aircraft Technical Book Co. 2. "EASA Module 7A Maintenance Practices" by Aircraft Technical Book Co. 3. "The Jet Engine 5th Edition" by Rolls Royce 4. "Airline Maintenance and Aircraft Manufacturing: Analyses of Select Issues" by Laura T. Pierson 5. "Introduction to Nondestructive Testing – A Training Guide, Second Edition" by Paul E. Mix 6. "Structural Health Monitoring" by Daniel Balageas, Claus-Peter Fritzen, Alfredo Guemes	

January 2021

Subject Description Form

Subject Code	AAE4109
Subject Title	Aircraft Maintenance Practices
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requiste:** AAE2102/ IC2133 Aircraft Manufacturing and Maintenance Fundamentals
Objectives	To provide students with knowledge of aircraft maintenance practice and application in modern aircraft maintenance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire good understanding of safety precautions of aircraft and workshop; and b. Acquire good understanding of aircraft engineering drawing as well as aircraft fits and clearances system; and c. Obtain fundamental knowledge in the area of aircraft screw system and locking devices; and d. Demonstrate good understanding of aircraft maintenance procedures; and e. Apply their knowledge to handle and store aircraft.
Subject Synopsis/ Indicative Syllabus	**Safety Precautions -** Aircraft and Workshop – Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents. **Workshop Practices -** Care of tools, control of tools, use of workshop materials; dimensions, allowances and tolerances, standards of workmanship; calibration of tools and equipment, calibration standards. **Tools** - Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods; Operation, function and use of electrical general test equipment. **Avionic General Test Equipment** - Operation, function and use of avionic general test equipment. **Engineering Drawings, Diagrams and Standards** - Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America;

<table>
<tr><td></td><td>Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.

Fits and Clearances - Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; standard methods for checking shafts, bearings and other parts.

Screw threads - Screw nomenclature; thread forms, dimensions and tolerances for standard threads used in aircraft; measuring screw threads.

Locking devices - Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.

Pipes and Unions - Identification of, and types of rigid and flexible pipes and their connectors used in aircraft. Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes; Bending and belling / flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.

Electrical Cables and Connectors - Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.

Aircraft Weight and Balance - Centre of gravity / balance limits calculation: use of relevant documents; Preparation of aircraft for weighing; Aircraft weighing.

Aircraft Handling and Storage - Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refueling / defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies; Effects of environmental conditions on aircraft handling and operation.

Maintenance Procedures - Maintenance planning; Modification procedures; Stores procedures; Certification / release procedures; Interface with aircraft operation; Maintenance inspection / quality control / quality assurance; Additional maintenance procedures; Control of life limited components.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures are used to deliver the fundamental knowledge in relation to aircraft maintenance practices (outcomes a to e).

Tutorials are used to illustrate the applications of fundamental knowledge to practical situations (outcomes a to e).
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="5">Intended subject learning outcomes to be covered</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Lecture</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></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Assignments / Quizzes	50%	✓	✓	✓	✓	✓
2. Final examination	50%	✓	✓	✓	✓	✓
Total	100 %					

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

Overall Assessment:

0.5 × Final Examination + 0.5 × 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 quizzes. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lectures	26 Hrs.
▪ Tutorials	13 Hrs.
Other student study effort:	
▪ Assignments	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	**105 Hrs.**

Reading List and References

1. "EASA Module 6 B1 Materials and Hardware" by Aircraft Technical Book Co.
2. "EASA Module 7A Maintenance Practices" by Aircraft Technical Book Co.
3. "The Jet Engine 5th Edition" by Rolls Royce
4. "Airline Maintenance and Aircraft Manufacturing: Analyses of Select Issues" by Laura T. Pierson
5. "Essentials of Airplane Maintenance" by Michael Loong

January 2021

Subject Description Form

Subject Code	AAE4110
Subject Title	Aircraft Propeller
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE2102/IC2133 Aircraft Manufacturing and Maintenance Fundamentals
Objectives	To provide students with knowledge of aircraft propeller and the major design features of modern aircraft propeller.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Obtain fundamental knowledge in the area of blade element theory; and b. Demonstrate good understanding of propeller design and construction; and c. Acquire good understanding of propeller control system and protection system; and d. Apply their knowledge and skills to explain the operation of aircraft propellers under both normal and abnormal situations.
Subject Synopsis/ Indicative Syllabus	**Propeller Fundamentals -** Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance. **Propeller Construction -** Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; propeller/spinner installation. **Propeller Pitch Control -** Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection. **Propeller Design Features -** Constant speed operations and logic; Stabiliser offset; Engine axis offset; Power absorption

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to aircraft propellers (outcomes a to d).

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

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Tutorial	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Assignments / Quizzes	50%	✓	✓	✓	✓
2. Final examination	50%	✓	✓	✓	✓
Total	100 %				

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

Overall Assessment:

0.5 × Final Examination + 0.5 × 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 quizzes. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lectures	36 Hrs.
▪ Tutorials	3 Hrs.
Other student study effort:	
▪ Assignments	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	**105 Hrs.**

Reading List and References	1. Rodriquez, C.L., EASA Module 17A Propellers, Aircraft Technical Book Co., 2nd Edition. 2. Weick, F.E. Aircraft Propeller Design, McGraw-Hill Book Company, Inc. Latest Edition 3. Kinney, J.R., Reinventing the Propeller. Aeronautical Specialty and the Triumph of the Modern Aircraft, Cambridge University Press, 2017

July 2021

Subject Description Form

Subject Code	AAE4111
Subject Title	Compressible Aerodynamics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE3008 Fundamental Thermal-fluid Science
Objectives	1. To provide students with knowledge in compressible aerodynamics; and 2. To develop students' capability in aerodynamic analysis of canonical geometries, nozzles, airfoils and wings with the consideration of compressibility.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Obtain fundamental knowledge in the area of aerodynamics primarily in inviscid compressible flow; and b. Gain comprehensive understanding of compressible flows over canonical geometries, nozzle, airfoils and wings; and c. Get familiar with flow physics involved in practical applications including transonic swept wings, shock tubes, super wings, and convergent-divergent nozzles.
Subject Synopsis/ Indicative Syllabus	**Linearised Flow** – Full Velocity Potential Equation; Linearised Subsonic Flow; Compressibility Corrections; Linearised Supersonic Flow. **Transonic Flows** –Velocity Potential Equations for Sub-transonic and Super-transonic Flows; Prandtl-Glauert Rule; Critical Mach number; Drag Divergence; Supercritical Airfoil; Swept Wings; Area Rule. **One-Dimensional** – Normal Shock Relations; One-Dimensional Flow with Heat Addition; One-Dimensional Flow with Friction; **Quasi-One-Dimensional Flows** –Area-Velocity Relation; Convergent/Divergent Nozzles and Diffusers. **Oblique Shock and Expansion Waves** – Oblique Shock Relations; Shock Polar; Pressure-Deflection Diagrams; Shock Interactions; Conical Flow; Prandtl-Meyer Expansion Waves; Supersonic Airfoils. **Unsteady Supersonic Flows** – Shock Tube Equations; Detonation

Teaching/Learning Methodology

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 compressible aerodynamics.

Technical/scientific examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lectures	✓	✓	✓
2. Tutorials	✓	✓	✓
3. Homework assignments	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignments	20%	✓	✓	✓
2. Tests	20%	✓	✓	✓
3. Experiments/Projects	20%	✓	✓	✓
4. Examinations	40%	✓	✓	✓
Total	100%			

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

1. The assessment is comprised of 60% continuous assessment (homework assignments, tests and experiment reports/project report) and 40% examination.
2. The continuous assessment consists of homework assignments, tests and experiments/projects. They are aimed at evaluating the progress of students' study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.
3. The examination 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:	
	▪ Lectures	33 Hrs.
	▪ Tutorials	6 Hrs.
	Other student study effort:	
	▪ Self-study	33 Hrs.
	▪ Homework Assignments	50 Hrs.
	Total student study effort:	**122 Hrs.**
Reading List and References	1. Anderson J. D., Fundamentals of Aerodynamics. McGraw-Hill, 6th edition, 2016. ISBN 13: 978-1259129919 2. Anderson J. D., Modern Compressible Flow: With Historical Perspective. McGraw-Hill, 3rd edition, 2012. ISBN 13: 978-0072424430 3. Bertin J. J. and Cummings R. M., Aerodynamics for Engineers. Pearson, 6th edition, 2013. ISBN 13: 978-0132832885	

Mar 2023

Subject Description Form

Subject Code	AAE4112
Subject Title	Satellite System Engineering and Design
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE3004 Dynamical Systems and Control AND AMA2112 Mathematics II
Objectives	This subject will provide students with 1. Basic theory and concepts of spacecraft engineering. 2. Design concept, principle, theory, and methodology of satellite systems and subsystems. 3. Hands-on experience of conducting experiments, software simulations, and programming. 4. An opportunity to solve a practical engineering problem with a CubeSat design project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Analyze practical engineering problems from a systematic and overall perspective. b. Identify and formulate the engineering problems related to the satellite topic with an understanding of engineering issues and constraints. c. Have preliminary capabilities for satellite (sub-)systems design and analysis and evaluate the design of the satellite based on the testing result and make necessary amendments to the design. d. Be able to use software tools to simulate the operations of the satellites.
Subject Synopsis/ Indicative Syllabus	**Satellite mission** – project management; system engineering; safety review process; safety requirements; environmental testing. **Satellite subsystems** – power control system; communication systems; command and data-handling system; structure system; mechanism system, thermal control system; attitude control system. **Satellite mechanics** – orbital science and mechanics; attitude mechanics; attitude control. **CubeSat project** – GMAT and MATLAB programming.

Teaching/Learning Methodology

Teaching is conducted through class lectures, case studies, and laboratory exercises. The basic knowledge, methodology, and theoretical analysis will be introduced in lectures. The understanding of how to design and test a satellite from a systematic engineering perspective is emphasized via case studies. Design methodology, analysis skills, satellite control techniques, and program methods are taught in laboratory sessions. Assignments and quizzes, laboratory exercises, projects, oral dissemination, and final reports are used to make up the coursework marks.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lectures	√	√	√	√
2. Case studies	√	√	√	
3. Laboratory Exercises	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1.Assignments/Quizzes	20%	√	√	√	
2. Laboratory & Report	30%			√	√
3. Final Report & Presentation	50%	√	√	√	√
Total	100 %				

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

Overall assessment:

0.5 x continuous assessment + 0.5 x final report

The continuous assessment (50%) is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus via several laboratory teaching and laboratory report, numerical analysis, reading assignment. In particular, Laboratory & Report are used to assess the students' capacities of self-study and problem-solving skills. In-class quizzes will be conducted to evaluate the students' understanding of the teaching materials as well as attendance taking. Final report and presentation are to evaluate the student's overall mastery level of the content of this subject.

Student Study Effort Expected	Class contact:	
	▪ Lecture	27 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Week 7 Reading week	3 Hrs.
	▪ Literature review / Scientific finding and analysis / report writing preparation	36 Hrs.
	▪ Self-study / preparation	36 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	[1] Sebestyen, G. (2018). Low earth orbit satellite design. Springer. [2] C. Cappelletti, S. Battistini, and B. K. Malphrus, Cubesat handbook : from mission design to operations. London, England: Academic Press, 2021. [3] Q. Chen, Z. Liu, X. Zhang, and L. Zhu, Spacecraft power system technologies. Singapore: Springer, 2020. [4] Kaplan, E. and C. Hegarty, Understanding GPS: principles and applications. Artech House Publishers, Latest Edition. [5] V. A. Chobotov, Orbital mechanics, 3rd ed. Reston, Va: American Institute of Aeronautics and Astronautics, 2002. [6] C.-T. Chen, Linear system theory and design, 3rd ed. New York ;: Oxford University Press, 1999.	

May 2025

Subject Description Form

Subject Code	AAE4113
Subject Title	Aerospace Propulsion
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	AAE3003 Aircraft Propulsion Systems
Objectives	This subject treat aerospace propulsion systems of all kinds, with a focus on spacecraft thrusters. Its intent is to foster an understanding of the characteristics of these diverse propulsion systems from the basic principles, showing how each uses sources of propulsive mass and energy to produce thrust.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the system differences between the different types of air-breathing propulsion and spacecraft propulsion. b. Analyse the operations and performance of various air-breathing propulsion and spacecraft propulsion. c. Apply the higher knowledge in air-breathing propulsion and spacecraft propulsion.
Subject Synopsis/ Indicative Syllabus	1. Introduction to thermodynamics, compressible flows, and quasi-one-dimensional flows. 2. Classification of the different types of air-breathing propulsion systems –turbojet, turbofan, turboprop, turboshaft, ramjet, scramjet. 3. Classification of the different types of spacecraft propulsion – solid rocket motors, liquid rocket engines, electric propulsion 4. Components and functions of solid rocket motors and liquid rocket engines 5. Combustion fundamentals– laminar and turbulent flames, diffusion and premixed flames, supersonic combustion.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, and a project.
2. Technical/scientific examples and problems are raised and discussed in class/tutorial sessions.
3. Advanced knowledge in air-breathing propulsion and spacecraft propulsion will be applied through a project.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	√	√	√
Tutorial	√	√	√
Homework assignments/tests	√	√	
Project	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Homework assignments/tests	30 %	√	√	
2. Project	30 %	√	√	√
4. Examination	40 %	√	√	√
Total	100 %			

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

Overall Assessment:

0.40 x End of Subject Examination + 0.60 x Continuous Assessment

The continuous assessment consists of three components: homework assignments, tests and a project. Homework assignments and tests 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 project requires application of the new knowledge attained in this course to complete a task which simulates working as a propulsion engineer in the real world.

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	33 Hrs.
	▪ Tutorials	6 Hrs.
	Other student study effort:	
	▪ Self-learning	26 Hrs.
	▪ Assignments	50 Hrs.
	Total student study effort:	115 Hrs.
Reading List and References	1. Rocket Propulsion Elements, 9th Edition, 2016, G. Sutton & O. Biblarz, Wiley. 2. Elements of Propulsion: Gas Turbine and Rockets, 2nd Edition, 2006, J. Mattingl. & K. Boyer, AIAA. 3. An Introduction to Combustion: Concepts and Applications, 4th Edition, 2021. Turns, S. et al., McGraw Hill.	

May 2024

Subject Description Form

Subject Code	AAE4202
Subject Title	Electronics & Information Technologies for Unmanned Aerial Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge of electronics and information technologies for unmanned aerial vehicles (UAV) and unmanned aircraft systems (UAS).
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Possess all required concepts and skills related to the remote control and primary autonomous unmanned aircraft systems; and b. Apply the learnt concepts and skills to operate, maintain and perform diagnosis on existing unmanned aircraft systems; and c. Extend their knowledge to analyse and develop new modules or algorithms in unmanned aircraft systems for desired needs.
Subject Synopsis/ Indicative Syllabus	**System Component, Electronic Device, and Radio Link** Common system components of UAS: airframe, servo, propulsion system (motor, electronic speed controller (ESC), propeller), Li-po battery, radio transmitter and receiver, telemetry, ground control station (GCS), and the autopilot. **Dynamic Modelling of Unmanned Aerial Vehicle** Coordinate systems, kinematic model, dynamic model, propulsion system model, controller allocation model of UAS and model linearisation method. **Flight Control Framework** Cascade control structure, position control, attitude control, and control allocation for the low-level control of UAS. **Path and Trajectory Planning** Global path planning for UAS including search-based methods and sample-based methods. Local smooth trajectory generation methods. **Autopilot System Integration and Flight Simulation** Open-source flight controller; Flight simulation platform; Programming and hardware interface; Implementation of control and planning algorithms, Introduction to autonomous aerial robotic system. **Mini UAS Flight Test** Integrate the hardware and software; flight test in an indoor laboratory.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures/hands on sessions, assignments, test, project and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for unmanned aircraft systems.
3. Technical/practical examples and problems are raised and discussed in class/hands on sessions.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	
2. Hands on	✓	✓	
3. Assignment	✓	✓	
4. Project	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignment	20 %	✓	✓	
2. In-class test	20 %	✓	✓	
3. Project (flight show and project report)	50 %	✓	✓	✓
4. Presentation	10 %	✓	✓	✓
Total	100%			

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

Overall Assessment:

1.0 × Continuous Assessment

The continuous assessment consists of four components: assignments, in-class test, project and presentation. The assignments and the in-class tests aim at enhancing students' understanding of the lecture content. The project enables students to apply the learnt knowledge in lectures to practice. Students will learn the basic hardware components for UAS, implement some algorithms learnt in lectures, integrate the algorithms in the provided hardware and conduct flight test

	in an indoor laboratory. Completing the project indicates that the students grasp the learnt knowledge. In the presentation, students will present selected topics relevant to the subject content to enhance their understanding.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	21 Hrs.
	▪ Project	18 Hrs.
	Other student study effort:	
	▪ Self-study and extended reading	22 Hrs.
	▪ Practice	44 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. Quan, Quan. Introduction to multicopter design and control. Springer, 2017 2. Kenzo Nonami et al, Autonomous flying robots: unmanned aerial vehicles and micro aerial vehicles, Springer, 2010. 3. Donald Norris, Build your own quadcopter: power up your designs with the Parallax Elev-8, New York: McGraw-Hill Education, 2014	

Jun 2024

Subject Description Form

Subject Code	AAE4203
Subject Title	Guidance and Navigation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite:** AAE3004 Dynamical Systems and Control **OR** AAE4301 Avionics Systems
Objectives	1. To provide a fundamental understanding and knowledge of conventional and modern design and working principles of navigation and guidance for unmanned autonomous systems (UAS); and 2. To provide the basic mathematical concepts of navigation by inertial and satellite approaches and guidance laws; and 3. To provide an expansive view into the technological trends of future UAS navigation and guidance systems designs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand and explain the working principles of navigation and guidance systems for unmanned autonomous systems (UAS); and b. Competently apply the fundamental mathematical concepts of UAS navigation; and c. Critically evaluate the characteristics, purposes, and design procedures of UAS navigation and guidance systems; and d. Identify the technological and design trends of future UAS navigation.
Subject Synopsis/ Indicative Syllabus	**Inertial Navigation System –** reference frames; principles of inertial navigation; gyroscope and accelerometer; attitude estimation and Euler angles. **Satellite Navigation System** – principles of satellite navigation; basic principle of the GNSS single point positioning, measurements modeling. Introduction to the GNSS real-time kinematic positioning for unmanned autonomous systems (UAS) navigation. **Integrated Navigation System –** Kalman filter and estimation theory; integration of inertial and satellite navigation; redundancy and consistency check. **Vision navigation in UAS –** Visual sensor model, the basic principle of visual matching, feature tracking, and visual positioning and navigation. **State Estimation for UAS** – Concepts of state estimation, the basic principle of the state estimation based on Kalman filtering, factor graph optimization. The example

<table>
<tr><td></td><td>of the state estimation in UAV positioning and navigation

Case Studies - Design and discussion of navigation and guidance systems for various air vehicles. Technological trends in future UAS navigation and guidance systems.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures are used to deliver the fundamental concepts, theory, mathematical background and technical knowledge related to unmanned autonomous systems (UAS) Guidance and Navigation (outcomes a, b, c and d).

Tutorials are used to provide a deeper understanding of the theoretical material, and to put theoretical material into use via practical examples and demonstrations (outcomes b and c).

Homework assignments, in the form of quiz and problems and case studies, and mini group research project, are used to allow students to reflect on and deepen their knowledge on a selected topic (outcomes a, b, c and d).

A reading week will be assigned in week 7. Student will be provided with tutorial and materials for reading during the week 7 without in classroom lecture.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes to be covered</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. Mini Group Project</td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>4. Homework assignments</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Homework assignments</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Test</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Mini Group Project</td><td>20%</td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>4. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
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	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 All homework assignments are designed to assist and enhance the understanding of the fundamental theories and concepts taught during the course of the subject, and to be sufficiently practical to allow students to apply the theories and concepts in practice. Test and Examination serve to evaluate the student's ability in all of the intended learning outcomes.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Laboratory/Tutorial	6 Hrs.
	Other student study effort:	
	▪ Week 7 Reading Week	3 Hrs.
	▪ Continue Assessment	35 Hrs.
	▪ Self-study	36 Hrs.
	Total student study effort	**110 Hrs.**
Reading List and References	1. David Wyatt, Aircraft Flight Instruments and Guidance Systems: Principles, Operations and Maintenance, Routledge, latest edition. 2. Lawrence, Modern Inertial Technology – Navigation, Guidance, and Control latest edition, Mechanical Engineering Series, Springer, latest edition. 3. Modern Navigation, Guidance and Control Processing Volume-II, Ching-Fang Lin, Prentice Hall Series in Advanced Navigation, Guidance and Control and Their Applications.	

May 2025

Subject Description Form

Subject Code	AAE4304
Subject Title	Advanced Positioning and Navigation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with advanced knowledge of positioning and navigation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Possess all required mathematical concepts and skills related to the area of positioning and navigation; and b. Apply the learnt concepts and skills to maintain and perform diagnosis on existing positioning and navigation systems; and c. Extend their knowledge to analyse and develop new electronic modules and components in positioning and navigation for desired needs.
Subject Synopsis/ Indicative Syllabus	**Introduction and Radio Theory**: EM radiation (radio waves); dipole aerial; polarisation; radio frequency spectrum; frequency, amplitude, pulse and phase modulation; SSB in HF communications; pulse modulation; classification of emissions; refraction, reflection, diffraction and attenuation; dipole, parabolic, phase array and slotted antennae; VHF; VHF/UHF; signal propagation; atmospheric/ionospheric ducting; Doppler effect; **NDB and ADF**: ground DF; VDF let-down procedure; NDB frequencies; NDBs locators and beacons; ground installations; BFO; NON A1A and NON A2A; ADF; cardioid polar diagram; RBI/RMI; errors of NDB/ADF; ICAO required fixing accuracy of NDBs; QDM and QDR interception **VOR and VOR Tracking**: VOR frequencies; principle of operation; aircraft navigation reception equipment; aircraft installation; VOR indicator/OBI; ICAO required accuracy of VOR; error of VOR; self-monitoring function; radial cross cuts; **Landing Aids**: DME, interrogation response, required accuracy, transmission classification P0N, beacon saturation. ILS Localiser, Glide-path, ILS displays on the OBI, HSI and EFIS PFD, limits of ILS CATI, II and III, MLS, principle of operation, ICAO required accuracy **Radar**: Radar theory, operating frequencies, pulse radar, radar mile, factors controlling bearing and range resolution, ground based radars, Airborne Weather Radar (AWR), CWR (radio altimeter), Mention Doppler Radar (MTR) **Transponders**: SSR transponders, operation principle, digital data in pulse transmission, Mode A and C, ADS-B

Area Navigation Systems (RNAV), FMS & EFIS: ICAO Annex 11; B-RNAV and P-RNAV; operation of basic RNAV; limitations of B-RNAV; RNP; FMC/FMS operation; internal database content and structure; FMS set-up procedure; EFIS system; recognise and interpret glass cockpit displays; failure warnings; SEI

Global Navigation Satellite Systems -FANS & RNAV Approaches: ICAO required accuracy for GPS; GPS in ADS-B

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 positioning and navigation.

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

Teaching/Learning Methodology	Intended subject learning outcomes to be covered		
	a	b	c
1. Lecture	✓	✓	✓
2. Tutorial	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments	20 %	✓	✓	
2. Mid-term test	30 %	✓	✓	✓
3. 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. 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	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Self-Study	22 Hrs.
	▪ Case Study	44 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. Oxford ATPL Manual 11 - Radio Navigation – EASA, Oxford Publishing, Latest Edition 2. Davide Dardari et al, Satellite and terrestrial radio positioning techniques: a signal processing perspective, Oxford Academic Press, 2012. 3. Pratap Misra, Global positioning system : signals, measurements, and performance, Ganga-Jamuna Press, 2006 4. Pat Langley-Price et al, Ocean yachtmaster : Adlard Coles' coursebook for ocean navigation student, Adlard Coles Nautical, 2007. 5. Mohinder S. Grewal, Global navigation satellite systems, inertial navigation, and integration, John Wiley & Sons, 2013 6. Aboelmagd Noureldin, Fundamentals of inertial navigation, satellite-based positioning and their integration, Springer, 2013	

Revised in January 2022

Subject Description Form

Subject Code	AAE4902
Subject Title	Pilot Ground Theory
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To teach the fundamental knowledge to students who wish to learn the technical and theoretical aspects of flying, and have the desire to pursue their PPL or CPL in the future; and 2. To familiarise student with the use of aeronautical information services, government references and publications for flight planning and navigation purposes; and 3. To teach students aeromedical factor and pilot decision-making to improve pilot's performance; and 4. To develop student's knowledge on the essential knowledge in airworthiness, preparation for flight, and the safe operation of aircraft.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Possess good knowledge in pilot (aeroplane) ground theory including air law, flight rules and procedures; and b. Efficiently utilise aeronautical information services, government references and publications for flight planning and navigation purposes; and c. Recognise the influence and importance of human factor and human performance on flight safety; and d. Possess in-depth understanding of the principle of flight, operation of airplane, pre-flight and airworthiness.
Subject Synopsis/ Indicative Syllabus	**Aviation Law, Flight Rules and Procedure -** Aviation law, Flight Rules and Procedure covering: The Air Navigation Order, The Hong Kong Aeronautical Information Publication, Hong Kong Civil Aviation (Investigation of Accidents) Regulations, AOPA Ground Training Manual. **Navigation -** Meteorology, Aviation Weather Theory and Aviation Weather Services, Air Traffic Control and Airspace, Aeronautical Charts, Navigation Charts and Publications, Communication, Radar Navigation Systems. **Aircraft -** Airplane Instruments and Basics of Onboard Guidance and Navigation Systems from a pilot's perspective. Airplane Performance, Aircraft Weight and Balance. **Aeromedical Factors and Aeronautical Decision Making -** Basic Aviation Physiology and Health Maintenance, Human Limitations, Stress and Stress Management, Ergonomics of the Flight Deck, the Decision-Making Process and Situational Awareness.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental theory, technical and operational knowledge, and civil aviation regulations that are studied by student private and commercial pilots in ground theory courses. The knowledge will provide the fundamental knowledge necessary to students who may wish to later pursue their private or commercial pilot's licenses (outcomes a to d).

Tutorials are used to illustrate and familiarise the application of fundamental knowledge to practical flight situations (outcomes b and c).

Homework assignments, in the form of investigations and evaluations, case studies and flight planning, are used to allow students to deepen their knowledge on a selected topic through search of information, analysis of data and report writing (outcomes a to d).

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Tutorial		✓	✓	
3. Homework assignments	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignments	25%	✓	✓	✓	✓
2. Test	25%			✓	✓
3. 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

All homework assignments are designed to assist and enhance the understanding the fundamental theories and concepts taught during the course of the subject, and to be sufficiently practical to allow students to apply the theories and concept in practice.

Test and Examination serve to evaluate the student's ability in all of the intended learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial / Experiment	6 Hrs.
	Other student study effort:	
	▪ Course work	30 Hrs.
	▪ Self-study	36 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. CAD 54 – Requirements Document: Pilot Licenses and Associated Ratings, Hong Kong Civil Aviation Department. 2. Paul E, Illman, The Pilot's Handbook of Aeronautical Knowledge, latest edition, McGraw-Hill, New York, latest edition. 3. FAA Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25A, Flight Standard Service, US DOT FAA, latest edition.	

Revised in July 2022

Subject Description Form

Subject Code	AAE4904
Subject Title	Meteorology in Aviation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with general knowledge of a pilot completing a safe flight in given meteorological conditions and the effect of weather conditions within the atmosphere to aircraft operation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Possess essential knowledge and skills in the area of aircraft meteorology; and b. Identify all the weather information which may affect a given flight; and c. Analyse and evaluate available weather information before flight as well as that collected in flight; and d. Apply a solution to any problems presented by weather conditions.
Subject Synopsis/ Indicative Syllabus	**Wind -** Definition and measurement of wind, Primary cause of wind, General global circulation, Local winds, Mountain waves (standing waves, lee waves), Turbulence, Jet streams. **Thermodynamics –** Humidity, Change of state of aggregation, Adiabatic processes. **Clouds and Fog -** Cloud formation and description, Fog, mist, haze. **Precipitation -** Development of precipitation, Types of precipitation. **Air Masses and Fronts -** Air masses and Fronts. **Pressure Systems -** The principal pressure areas, Anticyclone, Non-frontal depressions, Tropical revolving storms. **Climatology -** Climatic zones, Tropical climatology, Typical weather situations in the mid-latitudes, Local winds and associated weather. **Flight Hazards –** Icing, Turbulence, Wind shear, Thunderstorms, Tornadoes, Inversions, Stratospheric conditions, Hazards in mountainous areas, Visibility-reducing phenomena. **Meteorological Information -** Observation, Weather charts, Information for flight planning, Meteorological services.

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 aircraft meteorology.

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

4. Special seminar(s) delivered by invited industrial professionals may be used to relate the concepts learnt in class to aviation practices.

Teaching/Learning Methodology	Intended subject learning outcomes to be covered			
	a	b	c	d
1. Lecture	✓	✓	✓	✓
2. Tutorial	✓	✓		
3. Homework 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. Continuous Assessment	50%	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓
Total	100%				

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

Overall Assessment:

0.5 × End of Subject Examination + 0.5 × Continuous Assessment

The continuous assessment consists 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 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	33 Hours
	▪ Tutorial	6 Hours
	Other student study effort:	
	▪ Self-Study	66 Hours
	Total student study effort	**105 Hrs.**
Reading List and References	1. Oxford ATPL Manual 9 - Meteorology – EASA, Oxford Publishing, Last Edition. 2. Roy Quantick, Climatology for Airline Pilots, John Wiley & Sons, Last Edition. 3. S. Raghavan, Radar Meteorology, Springer Science & Business Media, Last Edition.	

February 2020