THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Interdisciplinary Division of Aeronautical and Aviation Engineering
航空工程跨領域學部

Interdisciplinary Division of Aeronautical and Aviation Engineering (AAE)

Bachelor of Engineering (Honours)
in
Air Transport Engineering
民航工程學(榮譽)工學士學位

Programme Code: 48401
(Full-time Credit-based)

Definitive Programme Document
(For 2018/19 cohort)

August 2018

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PART A PROGRAMME SCHEME

1. General Information

1.1 Introduction

Programme Title	Bachelor of Engineering (Honours) in Air Transport Engineering 民航工程學 (榮譽)工學士學位
Host Department	The programme is hosted by the Interdisciplinary Division of Aeronautical and Aviation Engineering (AAE) of Faculty of Engineering, with the support of the following academic departments: • Department of Electrical Engineering • Department of Electronic and Information Engineering • Department of Industrial and Systems Engineering • Department of Mechanical Engineering
Programme Structure	Credit-based
Mode of attendance	Full-time
Duration	Normal : 2 years (4 semesters) Maximum: 4 years (8 semesters)
Final Award	Bachelor of Engineering (Honours) in Air Transport Engineering 民航工程學 (榮譽)工學士學位
Credits required for graduation	(a) Academic credits: **Normally 66*** *exact number of credits depends on the academic background of students (b) Training credits: **4** (c) Work-Integrated Education (WIE) Training Credit: **1**
Implementation Year	The first intake started in September 2014

1.2 Characteristics

The programme has the following characteristics:

(a) A specialized programme providing fundamental aeronautical knowledge for students to prepare for licensed or design aircraft engineer certification and aviation operation management.

(b) Some of the 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.

1.3 Minimum Entrance Requirements

An Associate Degree or a Higher Diploma in a related engineering discipline.

1.4 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 Division. Credit transfer for students joining exchange programmes will be granted on a case by case basis. Depending on the transferability of credits, students may need to defer graduation after completing the exchange programmes. 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.

1.5 External Recognition

The programme has been granted provisional accreditation by the Hong Kong Institution of Engineers (HKIE). It will seek professional recognition from the Royal Aeronautical Society (RAeS).

1.6 Summer Term Teaching

Usually, there will be no summer term teaching. Industrial Centre Training or External Training may take place during the summer.

1.7 Daytime and Evening Teaching

Subjects will be offered predominantly during weekdays/Saturdays. Some subjects may be made available only in evenings or Saturdays/Sundays.

2. Rationale, Objectives and Intended Learning Outcomes of the Programme

2.1 Rationale

The aviation industry is an assembly of subsidiary industries embracing aircraft manufacturers, aircraft parts suppliers, aviation services providers, aircraft fuel providers, regulatory authorities, airports, airlines, training organizations, aircraft maintenance organizations and financial institutions.

Hong Kong is the most important regional hub and has one of the busiest airports in the world. The current serious shortage of qualified aviation professionals is a bottleneck for the sustainable growth of our aviation industry. This articulation degree programme aims at nurturing professionals with in-depth practical skills and academic knowledge in air transport engineering to serve the aircraft maintenance engineering, airline and airport operations industries. With the fast-growing aircraft engineering business in greater China, the programme is also designed as a foundation to train up potential graduates to be capable of taking up postgraduate study and R&D tasks in designing and manufacturing aircraft parts and components.

Graduates of this programme can find employment as aircraft maintenance engineers, commercial pilot, aviation operation officers, mechanical engineers, quality assurance specialists, quality and safety officers, line maintenance planners, cargo officers, maintenance controllers, engineers (civil aviation engineering) and graduate engineers.

2.2 Programme Objectives

This programme aims at producing graduates with:

1. In-depth understanding of the operation of air transport engineering including aircraft maintenance and airport operation businesses;
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 communication with different parties and stakeholders by the use of state-of-the-art technologies and aviation language (both English and Chinese).

2.3 Relationship of Programme Objectives to University Mission

The University has the following mission:

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

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

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

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

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

2.4 Institutional Learning Outcomes

The institutional learning outcomes are:

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

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

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

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

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

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

2.5 Intended Learning Outcomes of the Programme

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

Professional/academic knowledge and skills (PAK):

(a) identify, formulate and solve problems in the discipline of Air Transport industry by applying knowledge of mathematics, science and engineering;
(b) design and conduct experiments, as well as to analyze and interpret data;
(c) design a system, component or process to meet desired needs;
(d) use the techniques, skills and modern engineering tools, including computational tools necessary for engineering practice;
(e) work professionally in aircraft and aviation systems, including the design and realization of such systems; and
(f) understand manufacturing methods for components of aircraft and aviation systems.

Professional outlook and workplace skills (POW):

(a) 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) function professionally in multidisciplinary teams;
(c) understand professional and ethical responsibility;
(d) communicate effectively and professionally with different parties and stakeholders using appropriate industrial languages and tools;
(e) recognize the need for and engage in life-long learning.

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

Programme Outcomes	Programme Aims			
	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	√	√	√	√

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

Programme Outcomes	Institutional Learning Outcomes					
	(a)	(b)	(c)	(d)	(e)	(f)
PAK a	√	√		√	√	
PAK b	√	√		√	√	√
PAK c	√	√		√	√	√
PAKd		√	√		√	√
PAK e			√	√		√
PAK f	√	√		√	√	√
POW a	√	√		√		√
POW b		√	√	√	√	√
POW c		√	√	√	√	√
POW d		√	√	√	√	√
POW e					√	

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

The Hong Kong Institution of Engineers (HKIE) adopts 12 desired learning outcomes for an engineering degree [referenced to the "Professional Accreditation Handbook (Engineering Degrees)", issued by the HKIE Accreditation Board in February 2013, Pages 10-11]. A comparison between the desired learning outcomes for an engineering degree programme as proposed by the HKIE and the intended learning outcomes of the current programme is given below:

Learning Outcomes	Definition of Desired Learning Outcomes Proposed by HKIE	ILOs of the current programme
1	Ability to apply knowledge of mathematics, science and engineering appropriate to the degree discipline.	PAK: a, b, c, d POW: a
2	Ability to design and conduct experiments, as well as to analyse and interpret data.	PAK: b, c, d POW: a, b
3	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: b, c, d, f POW: a, b, c, e
4	Ability to function on multi-disciplinary team	POW: b
5	Ability to identify, formulate and solve engineering problems	PAK: a, b POW: a
6	Ability to understand professional and ethical responsibility	POW: c
7	Ability to communicate effectively	POW: b, d
8	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, f POW: a, b, c
9	Ability to stay abreast of contemporary issues	PAK: d, e, f POW: a, b, e
10	Ability to recognize the need for, and to engage in life-long learning	POW: e
11	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice appropriate to the degree discipline.	PAK: a, b, c, d POW: a, e
12	Ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitation.	PAK: d, e POW: a

3. Curriculum

3.1 Programme Specified Subjects

Unless specified otherwise, all subjects in the curriculum are of standard credit value carrying 3 credits each. A student is expected to spend about 35 to 45 hours of study (inclusive of class contact and other study effort) to earn a credit. The following table lists the subjects, their credit values 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.

Students are required to complete a minimum of 66 (9 credits for General University Requirements (GUR) and 57 credits for Discipline-Specific Requirements (DSR)) or more academic credits to satisfy the graduation requirements. The exact number of academic credits required will depend on the academic background of the students. The subjects contributing to the 66 academic credits are listed in the following table.

Subject Code	Subject Title	Credit	Pre-requisites (if any)	COM/ ELE
General University Requirements (GUR): 9 Credits				
	Cluster-Area Requirement I (CAR I)	3		COM
	Cluster-Area Requirement II (CAR II)	3		COM
	Service-Learning	3		COM
Discipline-Specific Requirements (DSR) – Compulsory Subjects: 45 Credits				
AAE3004	Dynamical Systems and Control	3		COM
AAE3005	Introduction to Aircraft Design and Aviation Systems	3		COM
AAE4002	Capstone Project	6	See syllabus	COM
CBS3341P	Chinese Communication for Air Transportation ^@	1		COM
EIE4112	Avionics Systems	3	AAE3005	COM
ELC3521	Professional Communication in English %@	2	LCR-English	COM
ENG3004	Society and the Engineer	3		COM
ENG4001	Project Management	3		COM
ISE3009	Aviation Safety and Reliability	3		COM
ME37001	Fundamentals of Aerodynamics	3		COM
ME37002	Aircraft Structures and Materials	3		COM
ME37003	Aircraft Propulsion Systems	3	ME37001	COM
ME37004	Flight Mechanics and Control	3		COM
ME37010	Air Transport Operations	3		COM
ME47010	Airworthiness	3	AAE3005 and ISE3009	COM
IC380	Integrated Aviation Engineering Project	4 (TRN)		COM
Discipline-Specific Requirements (DSR) – Elective Subjects: 12 Credits@				
AAE4001	Aviation Project Management	3		ELE
AAE4003	Airport Services Engineering	3		ELE
AAE4101	Aviation Power Systems	3		ELE
AAE4105	Engineering Composites	3	ME37002	ELE
AAE4106	Aircraft Gas Turbine Systems	3	ME37003	ELE
AAE4201	Flight Control Systems	3		ELE
AAE4302	Aircraft Electronics	3	AAE3005	ELE

Subject Code	Subject Title	Credit	Pre-requisites (if any)	COM/ ELE
AAE4304	Advanced Positioning and Navigation Systems	3	EIE4112	ELE
AAE4305	Advanced Electronics Instrumentation and Control – Flight Management Systems	3	AAE4302	ELE
AAE4902	Pilot Ground Theory	3	AAE3005	ELE
AAE4903	Human Factors in Aviation	3		ELE
AAE4904	Meteorology in Aviation	3		ELE
ISE4014	Aircraft Service Engineering and Logistics	3		ELE
ISE4016	Data Management and Operational Research	3		ELE
ISE518	Workflow Design and Management	3	See syllabus	ELE

Notes

AAE Interdisciplinary Division of Aeronautical and Aviation Engineering
CBS Department of Chinese and Bilingual Studies
EIE Department of Electronic and Information Engineering
ELC English Language Centre
ENG Faculty of Engineering
IC Industrial Centre
ISE Department of Industrial and Systems Engineering
ME Department of Mechanical Engineering

COM Compulsory subjects
ELE Elective subjects
TRN Training credits

^ waived for non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below.
% Students who are English native speakers would be considered for credit transfer based upon their previous qualifications.
@ Students who have been waived the DSR English and Chinese language requirements have to take one more 3-credit elective to fulfil the credit requirements for graduation.

3.2 Normal Progression Pattern

This section outlines the normal 2-year study pattern for the programme. It is for students who meet the equivalent standard of the Undergraduate Degree Language and Communication Requirements (LCR) (based on their previous studies in AD/HD programme and their academic performance). Students not meeting the equivalent standard of the Undergraduate Degree LCR will be required to take additional 9 credits LCR subjects. Details on the Undergraduate Degree LCR subjects are given in paragraph 5.15.4 and 5.15.5 of this booklet.

Year One (33 + 4 training Credits)			
Semester 1 (18 credits)		**Semester 2 (15 + 4 training credits)**	
	CAR I ^	ME37010	Air Transport Operations
AAE3004	Dynamical Systems and Control	EIE4112	Avionics Systems
AAE3005	Introduction to Aircraft Design and Aviation Systems	ISE3009	Airport Safety and Reliability
ME37001	Fundamentals of Aerodynamics	ME37003	Aircraft Propulsion Systems
ME37002	Aircraft Structures and Materials	ENG3004	Society and the Engineer
CBS3341P	Chinese Communication for Air Transportation (1 credits) *DSR Chinese*	IC380	Integrated Aviation Engineering Project (4 training credits)
ELC3521	Professional Communication in English *(2 credits) DSR English*		
Summer Internship (Optional)			
Year Two (33 credits)			
Semester 1 (18 credits)		**Semester 2 (15 credits)**	
	CAR II^	ENG4001	Project Management
	Service Learning ^	ME37004	Flight Mechanics and Control
ME47010	Airworthiness *(embedded with 1 credit DSR Chinese)*		Elective 3
	Elective 1		Elective 4
	Elective 2		
AAE4002 Final Year Capstone Project (6 credits)			

Elective Subject Pool^^

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 specialized knowledge in a specific area of aviation engineering. Students completing no less than 3 electives from any one of the study streams are considered having completed a stream of study in that specialism.

Streams	Elective Subjects
1. Aircraft Maintenance Engineering	1. AAE4101 Aviation Power Systems 2. AAE4105 Engineering Composites 3. AAE4106 Aircraft Gas Turbine Systems 4. AAE4201 Flight Control Systems 5. AAE4302 Aircraft Electronics 6. AAE4305 Advanced Electronics Instrumentation and Control - Flight Management Systems
2. Aviation Services Engineering	1. AAE4001 Aviation Project Management 2. AAE4003 Airport Services Engineering 3. ISE4014 Aircraft Service Engineering and Logistics 4. ISE4016 Data Management and Operational Research 5. ISE518 Workflow Design and Management
3. Pilot Ground Theory	1. AAE4902 Pilot Ground Theory 2. AAE4304 Advanced Positioning and Navigation Systems 3. AAE4903 Human Factors in Aviation 4. AAE4904 Meteorology in Aviation

^^ 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.

3.3 Work-Integrated Education (WIE)

In accordance with the University regulations, all full-time UGC-funded undergraduate degrees should fulfill the mandatory requirement of Work-integrated Education (WIE). WIE is "work-based learning experiences which take place in an organizational 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. Following the Faculty of Engineering's guideline, students will be awarded one WIE training credit for acquiring every two weeks' full-time training. WIE training credit will not be counted towards the Grade Point Average (GPA) or the Weighted GPA (WGPA).

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

- Internship opportunities organized by the Division/Office of Careers and Placement Services (CAPS)
- Summer placement in industrial/commercial sector
- Placement in industrial /commercial sector during the period of deferment of study/zero-subject enrolment

- Final Year Capstone Project which involves an external client or industrial partner
- Conduct in a form proposed by students with the prior approval of the Programme Leader

3.4 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.

3.5 Summer Internship

The University encourages students to take summer internship offered by relevant industrial sectors to provide them practical insight 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.

3.6 Capstone Project

All students are required to complete a final year project (group-based) which is counted for 6 academic credits. The aim of the project is to provide students an opportunity to utilize and integrate their knowledge of air transport engineering to solve real life problems related to the aviation industry. Students are encouraged to complete an industry-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 and etc.

3.7 Curriculum Map

The following matrix shows the contribution of each discipline-specific subject to the programme outcomes through teaching (T), practice (P) and measurement (M).

Curriculum Map for Core Subjects with PLOs

Subject Code	Programme Learning Outcomes (PLOs) of the ATE Programme										
	PAK						POW				
	a	b	c	d	e	f	a	b	c	d	e
AAE3004	TPM	TPM					TPM				
AAE3005			TPM		TP	TPM					
AAE4002	TPM	TPM	TP	TPM	TP	TP	TP	TPM	TP	TPM	TPM
CBS3241P					TP					TPM	
EIE4112		TP		TPM	TP	TPM				TPM	
ELC3521										TPM	
ENG3004							TPM		TPM		TPM
ENG4001				TPM			TP		TPM	TPM	TP
ISE3009					TPM		TP	TPM	TPM		
ME37001	TPM			TPM							
ME37002	TP	TPM	TPM			TPM					
ME37003				TP			TPM		TPM		
ME37004	TPM	TPM	TPM								TPM
ME37010	TP			TPM	TPM			TP	TPM		TPM
ME47010					TPM		TPM	TPM			
IC380				TP	TPM	TPM		TP		TP	TP

Curriculum Map for Elective Subjects with PLOs

Subject Code	Programme Learning Outcomes (PLOs) of the ATE Programme										
	PAK						POW				
	a	b	c	d	e	f	a	b	c	d	E
Aircraft Maintenance Engineering Technical Stream											
AAE4101	TP		TP		TP						TP
AAE4105	TP	TP				TP			TP		TP
AAE4106	TP			TP				TP	TP	TP	TP
AAE4201					TP	TP					TP
AAE4302	TP	TP	TP	TP						TP	TP
AAE4305	TP	TP		TP				TP			TP
Aviation Services Engineering Technical Stream											
AAE4001				TP	TP			T	TP	TP	
AAE4003				TP	TP				TP		
ISE4014	TP			TP					TP		
ISE4016	TP			TP			TP				TP
ISE518				TP			TP			TP	TP
Pilot Ground Theory Technical Stream											
AAE4902					TP				TP	TP	TP
AAE4304	TP			TP			TP				
AAE4903			TP		TP		TP		TP		
AAE4904	TP			TP				TP		TP	

4. Management and Operation

4.1 Divisional Undergraduate Programme Committee

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

4.2 Programme Executive Group

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

4.3 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 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

4.4 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 enhancing students' overall learning experience at PolyU. The specific objectives are:

1. To build up an early connection between the students and their home departments , and to promote their sense of affiliation to the department and the University,
2. To provide students with accurate information about the academic regulations and requirements regarding their programme, as well as the 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 intellectual, professional and personal goals,
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 responsibilieites of the academic advisor will include:

- Building rapport with the students, serving as a bridge that connects them to the department;
- Being accessible and available to sutdents, and responding to their questions and concerns;

- Helping student to consider and clarify their intellectual, professional and personal goals;
- Clarifying to students academic regulations and requirements, particularly those relating to the Major;
- Identifying students with special learning needs or early signs of learning problems, and referring/encouraging them to seek help or support.

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

- Understand the academic regulations and requirements of their chosen Major/programme, as well as the GUR requirements;
- Actively obtain information and seek out advisors and resources on a regular basis and as needed;
- Take the final responsibility for making decisions and choices regarding their academic study based on the information and advice given.

5. Academic Regulations

The academic regulations described below are based on the information known as of July 2018. 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: http://www.polyu.edu.hk/as/webpage/for-student/student-handbook).

5.1 Subject Registration and Withdrawal

5.1.1 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, 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.

5.1.2 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.

5.1.3 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. For students of full-time programmes, they can take additional subjects from within or outside their programme curriculum. Students can choose freely from those subjects which are available for selection (unless they are barred because of pre-requisties).

5.2 Study Load

5.2.1 For students following the progression pattern specified for their programme, they have to take the number of credits, as specified in the Definitive Programme Document, for each semester. Students cannot drop those subjects assigned by the department unless prior approval has been given by the department.

5.2.2 The normal study load is 15 credits in a semester. 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.

5.2.3 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 polices of individual departments and will be subject to the approval of the relevant authorities.

5.2.4 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 maximum period of registration.

5.2.5 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.

5.3 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.

5.4 Credit Transfer

5.4.1 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. Transferred credits may be counted towards more than one award. The granting of credit transfer is a matter of academic judgment.

5.4.2 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.

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

5.4.4 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 exempted 'deducted' credits at admission stage will be counted towards the maximum limit for credit transfer when students apply for further credit transfer after their admission. This also applied to students admitted to an Articulation Degree or Senior Year curriculum when they claim further credit transfer after admission.

5.4.5 All credit transfers approved will take effect only in the semester for which they are approved. A student who applies for transfer of credits during the re-enrolment or the add/drop period of 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.

5.4.6 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.

5.4.7 Students should not be granted credit transfer for a subject which they have attempted and failed in their current study.

5.4.8 For students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 60 credits to be eligible for award.

5.5 Zero Subject Enrolment/Deferment of study

5.5.1 Students are not allowed to have zero subject registration in any semester without prior approval from the programme offering department. Students failing to get prior approval for zero subject enrolment (i.e. taking zero subject in a semester) will be regarded as having unofficially withdrawn from the 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 enrolment will nevertheless be counted towards the maximum period of registration. Students will be responsible for ensuring that they complete their studies within the maximum period of registration. A fee for retention of study place will be charged.

5.5.2 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 maximum period of registration.

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

5.5.4 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.

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

5.6 General Assessment Regulations

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

5.6.2 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.

5.6.3 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 definitive programme document.

5.6.4 The language of assessment shall be English, unless approval is given for it to be otherwise.

5.7 Principles of Assessment

5.7.1 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.

5.7.2 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.

5.7.3 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 provided these are made within the framework of the General Assessment Regulations. Recommendations from Board of Examiners which fall outside these Regulations shall be ratified by the Academic Regulations Committee (ARC) and reported to the Senate.

5.8 Assessment Methods

5.8.1 Students' performance in a subject is assessed by continuous assessment and/or examinations, at the discretion of the individual subject offering department. Where both methods are used, the weighting of each in the overall subject grade is clearly stated. 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. Learning outcome should be assessed by continuous assessment and/or examination appropriately, in line with the outcome-based approach.

5.8.2 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.

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

5.8.4 At the beginning of each semester, the subject teacher will inform students of the details of the assessment methods to be used within the assessment framework as specified in this document.

5.9 Progression/Academic Probation/ Deregistration

5.9.1 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. 5.13.3 below) lower than 2.0, he will be put on academic probation in the following semester. If a student is able to pull his GPA up to 2.0 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in the transcript of studies.

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

(i) the student has exceeded the maximum period of registration for that programme, as specified in the Definitive Programme Document; or

(ii) the student's GPA is lower than 2.0 for two consecutive semesters and his Semester GPA in the second semester is also lower than 2.0; or

(iii) the student's GPA is lower than 2.0 for three consecutive semesters.

When a student falls within the categories as stipulated above, the Board of Examiners shall de-register the student from the programme without exception.

5.9.3 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 Definitive Programme Document.

5.9.4 A student may be de-registered from the programme enrolled before the time frame specified in para. 5.9.2(ii) and (iii) above if his academic performance is poor to the extent that the Board of Examiners deems that his chance of attaining a GPA of 2.0 at the end of the programme is slim or impossible.

5.10 Retaking Subjects

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

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

5.10.3 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 fulfill 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. (*Note 1*)

Note 1: In these circumstances when students do not have a choice to retake a failed subject, such as when the failed subject has been phased out, a 'tie-subject' arrangement can be made with the approval of the Faculty/School Board. Under the arrangement, another appropriate subject can be taken as equivalent to the subject which is not offered. Upon passing the equivalent subject, the fail grade of the original subject will be replaced by the latest grade of the retake subject and

the failure grade of the original subject will not be taken into account in the calculation of the GPA.

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

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

5.12 Exceptional Circumstances

Absence from an assessment component

5.12.1 If a student is unable to complete all the assessment components of a subject, due to illness or other circumstances which are beyond his control and considered by the subject offering department as legitimate, the department will determine whether the student will have to complete a late assessment and, if so, by what means. This late assessment shall take place at the earliest opportunity, and 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.

5.12.2 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 Lecturer concerned, in consultation with the Programme Leader.

Assessment to be completed

5.12.3 For cases where students fail marginally in one of the components within a subject, the BoE can defer making a final 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

5.12.4 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.

5.12.5 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.

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

5.12.7 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

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

5.13 Grading

5.13.1 Assessment grades shall be awarded on a criterion-referenced basis. A student's overall performance in a subject (including GUR subjects) shall be graded as follows:

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

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

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

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

5.13.3 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:

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

where n = number of all subjects (inclusive of failed subjects) taken by the student up to and including the latest semester/term. 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[1]
(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 assessment, will be included in the GPA calculation and will be counted as "zero" grade point. GPA is thus the unweighted cumulative average calculated for a student, for all relevant subjects taken from the start of the programme to a particular point of time. GPA is an indicator of overall performance, and is capped at 4.0.

5.13.4 For programmes with training components, whether these training credits[2] will be counted in the GPA calculation will be decided by the programme offering department.

[1] Subjects taken in PolyU or elsewhere and with grades assigned, and for which credit transfer has been approved, will be included in the GPA calculation.

[2] "Training credits" is used as a generic term only, and also includes clinical/field credits for programmes in different study disciplines. Laboratory experiments done as a subject/an integral part of a subject to satisfy the academic requirements is not considered to be practical training.

5.14 Different Types of GPA's

5.14.1 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.

5.14.2 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.

5.14.3 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. GUR subjects will be included in the calculation of weighted GPA for all programmes.

5.14.4 When a student has satisfied the requirements for award, an award GPA will be calculated to determine his award classification. GUR subjects will be included in the calculation of award GPA for all programmes.

5.15 University Graduation Requirements

5.15.1 To be eligible for the award of BEng(Hons) in Air Transport Engineering, an Articulation Degree award under the 4-year full-time undergraduate curriculum, a student must:

(i) Complete successfully 66 credits.
(ii) Satisfy all the 'compulsory' and elective' requirements
(ii) Earn a cumulative GPA of 2.0 or above at graduation.
(iii) Complete successfully the mandatory WIE component and stipulated IC training requirements.
(iv) Satisfy the residential requirement for at least one-third of the credits required for the award
(v) Satisfy the following GUR requirements:

Areas	**Credits**
▪ Language and Communication Requirements (LCR)	9 (see *Note 1*)
▪ Service-Learning	3
▪ Cluster-Area Requirements (CAR) 6 credits chosen from the following 4 cluster areas o Human Nature, Relations and Development o Community, Organisation and Globalisation o History, Cultures and World Views o Science, Technology and Environment and of which o No more than 3 credits (normally 1 subject) are from the same cluster area; o Need to fulfil the English and Chinese reading and writing requirements; and o Minimum of 3 credits should be in the subjects designated as 'China-related' for fulfilling the China Studies requirement (CSR)	6 (see *Note 2*)
Total GUR credits	18

Note 1: This is normally not required. Only those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programmes and their academic performance) will be required to take degree LCR subjects (as stated in 5.15.4 and

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

Note 2: Students may apply for a waiver if they have fulfilled the English and Chinese reading and writing requirements and/or CSR requirement in their previous studies.

(vi) Satisfy any other requirements as specified in the Definitive Programme Document of the award and as specified by the University.

5.15.2 There are subjects which are designed to fulfil the credit requirement of different types of subject. Students passing these subjects will be regarded as having fulfilled the credit requirements of the particular types of subject 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 fulfill free elective requirement for graduation purpose.

Language and Communication Requirements (LCR)

5.15.3 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), as stated in 5.15.4 and 5.15.5 below;
(ii) Writing Requirement, as stated in 5.15.6 below;
(iii) Reading Requirement, as stated in 5.15.7 below; and
(iv) Discipline-Specific Language Requirement, as stated in 5.15.8 below.

English

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

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

Table 1: Framework of English LCR subjects

HKDSE	Subject 1	Subject 2
Level 5 or equivalent	Advanced English for University Studies (AEUS) 3 credits	Any LCR Proficient level subject in English (see Table 2) 3 credits
Level 4 or equivalent	English for University Studies (EUS) 3 credits	Advanced English for University Studies (AEUS) 3 credits
Level 3 or equivalent	Practical English for University Studies (PEUS) 3 credits	English for University Studies (EUS) 3 credits

Table 2: LCR Proficient level subjects in English

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

Chinese

5.15.5 All undergraduate students are required to successfully complete one 3-credit Chinese language subject as stipulated by the University (Table 3). These Chinese subjects are designed to suit students' different levels of Chinese language proficiency at entry, as determined by their HKDSE score or the Chinese Language Centre (CLC) entry assessment (when no HKDSE score is available). Students can also opt to take additional Chinese LCR subjects (Table 5) in their free electives.

Students who are non-Chinese speakers (NCS), or whose Chinese standards are at junior secondary level or below, will also be required to take one LCR subject specially designed to suit their language background and entry standard as shown in Table 4.

Students who can demonstrate that they have achieved a level beyond that of the course "Advanced Communication Skills in Chinese" as listed in Table 3 (based on an assessment made by CLC) may apply for subject exemption or credit transfer of the LCR subject concerned.

Table 3: Framework of Chinese LCR subjects

	Required subject
HKDSE Level 4 and 5 or equivalent	Advanced Communication Skills in Chinese (ACSC) 3 credits
HKDSE Level 3 or equivalent	Fundamentals of Chinese Communication (FCC) 3 credits
For non-Chinese speakers or students whose Chinese standards are at junior secondary level or below	one subject from Table 4 below

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

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

Table 5: Other LCR Electives in Chinese

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

Writing Requirement

5.15.6 In additional to the LCR in English and Chinese explained above, all students must also, among the Cluster Areas Requirement (CAR) subjects they take (see para. 5.15.10 below), pass one subject that includes the requirement for a substantial piece of writing in English and one subject with the requirement for a substantial piece of writing in Chinese.

Reading Requirement

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

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

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

Discipline-Specific Language Requirement

5.15.8 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. 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.

Service-Learning

5.15.9 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://www2.polyu.edu.hk/as/Polyu/GUR/index.htm

Cluster Areas Requirement (CAR)

5.15.10 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 two 3-credit subjects chosen from the following four Cluster Areas:

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

- Science, Technology and Environment

and of which

- o No more than 3 credits are from the same cluster area;
- o Need to fulfil the English and Chinese reading and writing requirements; and
- o Minimum of 3 credits should be in the subjects designated as 'China-related'

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

China Studies Requirement

5.15.11 Of the 6 credits of CAR described in para. 5.15.10 above, students are required to successfully complete a minimum of 3 credits on CAR subjects designated as "China-related". The purpose is to enable students to gain an increased understanding of China (e.g. its history, culture and society, as well as emerging issues or challenges).

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

5.16 Guidelines for Award Classification

5.16.1 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.

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

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

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

n = number of all subjects counted in GPA calculation as set out in para. 5.13.3, except those exclusions specified in para. 5.16.3.

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, a weighting of 3 for Level 3, 4 and 5 subjects. Same as for GPA, Weighted GPA is capped at 4.0.

5.16.3 Any subjects passed after the graduation requirement has been met will not be taken into account of in the grade point calculation for award classification.

5.17 Classification of Awards

5.17.1 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

5.17.2 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.

5.17.3 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 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 2.0 or more, but his Weighted GPA is less than 2.0, he 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.

5.17.4 Students who have committed academic dishonesty 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.

5.17.5 The following is a set of indicators, for Boards of Examiners' reference, which can be used in helping to determine award classification:

Honours classification	**Weighted GPA**
First Class Honours	3.7^{+} - 4
Second Class Honours (Division 1)	3.2^{+} - 3.7^{-}
Second Class Honours (Division 2)	2.3^{+} - 3.2^{-}
Third Class Honours	2.0 - 2.3^{-}

Note: "+" sign denotes 'equal to and more than'; "–" sign denotes 'less than'.
There is no requirement for Boards of Examiners to produce award lists which conform to the above guidelines.

5.18 Recording of Disciplinary Actions in Students' Records

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

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

5.18.3 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.

5.18.4 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.

5.19 Graduation

A student is required to graduate as soon as he/she satisfies the graduation requirements as stipulated in para. 5.15 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.

PART B SUBJECT SYLLABI

Discipline-Specific Requirements (DSR)

Compulsory Subjects

Subject Description Form

Subject Code	AAE3004
Subject Title	Dynamical Systems and Control
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2112 Mathematics II
Objectives	1. To introduce basic concepts and methods of feedback control and automatic control systems. 2. To introduce the mathematical modeling of physical elements in dynamic systems. 3. To provide with a basic understanding of behaviour of first- and second-order systems due to typical inputs, and concepts of time-domain specifications. 4. To introduce the basic concepts of frequency response and frequency domain specifications. 5. To introduce feedback control and its application to improve the overall system behaviour. 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. Find the transfer function for a system composed of mechanical and other physical components or given the block diagram of a system. Predict the output response of a first- or second-order system both in time and frequency domains subject to typical input signals. b. Understand how the system dynamic behaviour is related to system specifications and how it can be improved according to these specifications using some combination of parameter tuning and feedback control. c. Describe how changes in parameter values will affect the stability of a control system, and apply Routh-Hurwitz criterion to find the parameter range for stability. d. Understand basic applications of proportional, integral and derivative feedbacks in control systems to improve performance or stability.
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, Bode diagrams, frequency domain specifications, frequency response applications. ***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.

Lab sessions:
There are two 2-hour lab sessions.
Typical tasks:
1. Control systems analysis and design using time-domain method
2. Control systems analysis and design using frequency-response method
3. Control systems design using PID

Teaching/Learning Methodology

The teaching and learning methods include lectures, tutorials and laboratory experiments.

The lectures aim at providing students with an integrated knowledge required for understanding and analyzing dynamic systems and fundamental feedback control.

The tutorials aim at enhancing the analytical skills of the students. 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 using the knowledge they acquired in the class.

The experiments will provide the students with hand-on experience on the instrumentation and measurement of physical variables such as motor speed and water level, and their control. It also trains students in the analysis and presentation of experimental data.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	√	√	√	√
Lab		√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Class tests and reports	25%	√	√	√	√
2. Home work	25%	√	√	√	√
3. Examination	50%	√	√	√	√
Total	100%				

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

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

	Assessment: Assignments, laboratory reports, and tests are adopted in continuous assessment on students' timely feedback to and on-going understanding of the course. The students' overall understanding of the course and ability in applying the delivered knowledge are further assessed through a formal examination.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	35 Hrs.
	▪ Laboratory	4 Hrs.
	Other student study effort:	
	▪ Self-study	42 Hrs.
	▪ Homework assignment	15 Hrs.
	▪ Laboratory report	6 Hrs.
	Total student study effort	106 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.	

Subject Description Form

Subject Code	AAE3005
Subject Title	Introduction to Aircraft Design and Aviation Systems
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To develop students' knowledge on the components and operating principles of essential mechanical, electrical and avionics systems in civil transport aircraft. To provide students an overview of the components of aviation systems. To develop students' understanding of the up-to-date operational concepts, technology applications and practices in aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand key aircraft systems including flight control system, fuel system, propulsion system, hydraulic system, electrical systems, avionics system, environmental control system, pneumatic system, and emergency system; b. explain the relationship among major aviation systems; c. understand air traffic management, flight standards, airworthiness provided by regulatory bodies, and accident investigation.
Subject Synopsis/ Indicative Syllabus	***Atmospheric Condition*** - Properties of air. The Earth's atmosphere. Standard atmosphere. Atmospheric wind and turbulence. ***Flight Control Systems*** - Principles of flight control. Primary and secondary flight controls. ***Powerplant and Fuel Systems*** - Aircraft engine. Turbojet engine. Characteristics of aircraft fuel systems. ***Hydraulic Systems and Pneumatic Systems*** – Hydraulic systems in aircraft and their applications. Landing-gear system. Braking and anti-skid. Use of bleed air. Bleed air control. Thrust reversers. ***Electrical Systems*** - Civil aircraft electrical system. Electrical power generation. Motor and Actuators. Electrical loads. ***Avionics Systems*** – Regulatory and Advisory Agencies related to

<table>
<tr><td></td><td>avionics systems. Fundamentals of airborne communication systems. Basic principles of terrestrial radio navigation and landing aids.

Environmental Control Systems - Environmental control system design, Lighting, Air conditioning. Cabin pressurization.

Land Gear Systems - Aircraft landing gear, gear arrangement, retraction and detraction, structures and tyres.

Emergency Systems - Emergency power generation. Battery system. Warning systems. Fire detection and suppression.

Aviation Systems – Key aviation system components. Relationship among various components. Flight planning. Flight simulator. Airport operation. Airline management.

Aviation Authorities, Air Agreements and Government Flying Service - Key aviation authorities. Bi-lateral agreement. Air transportation agreements. Role of Government Flying Service.

Air Traffic Control – Radar fundamentals & basic surveillance systems, e.g. ATCRBS.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures and tutorials are used to deliver the fundamental knowledge in relation to various aircraft systems and aviation systems (outcomes a to c).

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="3">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Lectures</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Tutorials</td><td>✓</td><td>✓</td><td>✓</td></tr>
</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 (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Assignments and quiz</td><td>50%</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:</td></tr>
</table>

	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, 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	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. I. Moir amd A.G. Seabridge, Design and Development of Aircraft Systems – An Introduction, First Edition, AIAA Education Series, 2004. 2. Richard De Neufville. Airport Systems: Planning, Design, and Management, McGraw-Hill, 2003. 3. Jon D. Fricker and Robert K. Whitford, Fundamentals of Transportation Engineering: A Multimodel Systems Approach, Prentice-Hall, 2004. 4. Helfrick A, Principles of Avionics, 7th Edition, Avionics Communications, 2012.	

October 2016

Subject Description Form

Subject Code	AAE4002
Subject Title	Capstone Project
Credit Value	6
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: 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.
Objectives	To provide students an opportunity to utilize 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) Understand the workflow of airport/airline/aircraft engineering operations. b) Conduct literature review, apply knowledge and up-to-date technologies to design, engineer and solve engineering problems in the aviation industry. c) Work effectively in a team, contribute individually in a multi-disciplinary/functional team, and apply project management technique to ensure successful completion of the project. d) Understand the importance of life-long learning and perform literature review to upkeep with the state-of-the-art aviation technologies. e) Effectively and professionally communicate with different parties and stakeholders.
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 • Literature review • Methodology of study • Project execution • Report writing • Project presentation
Teaching/Learning Methodology	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 organization, and submit the necessary WIE required documentations.

Teaching/Learning Methodology	a	b	c	d	e
Site visit	√				
Guided study	√	√	√	√	√
Oral presentation					√
Report writing			√		√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Continuous monitoring	10	√	√	√	√	√
2. Interim report	20	√	√	√	√	√
3. Final report	50	√	√	√	√	√
4. Oral examination	20	√	√			√
Total	100 %					

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

Overall Assessment: 1.0 x 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 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	

June 2018

Subject Description Form

Subject Code	CBS3341P
Subject Title	Chinese Communication for Air Transportation
Credit Value	1
Level	3
Pre-requisite / Co-requisite	Nil
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. Analyzing the Chinese lexical structure of the frequently used terms from the linguistic viewpoint *(see Note below).* 3. 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 Aeronautical circulars, etc.

	4. 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 Note: The one-credit DSR-Chinese content "The Chinese Vocabulary and Terminology in Air Transportation" is embedded into the subject "ME47010 Airworthiness"
Teaching/Learning Methodology	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

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. Report in Chinese	35%	✓	✓		
2. Practical Writing	25%		✓	✓	
3. PPT Presentation	30%		✓		✓
4. Formal discussions and Class participation	10%	✓	✓	✓	✓
Total	100 %				

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.

Each assignment will be assessed in terms of criterion reference assessing.

The overall achievement is obtained by formative assessment.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	9 Hrs.
	▪ Tutorial	4 Hrs.
	Other student study effort:	
	▪ Outside class practice, e.g. planning, discussing, and writing assignments and report. ▪ Researching and self-study	28 Hrs.
	Total student study effort	41 Hrs.

Reading List and References	1. 國際民航組織（1997）《國標民航運輸管理手冊（國際民航組織第9626號文件）》。中國民航出版社，第1版。 2. 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。 3. 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。 4. 于成鯤主編（2003）《現代應用文》。復旦大學出版社。 5. 鄭笑平（2005）《科技寫作》。河南人民出版社。 6. 邵敬敏（2007）《現代漢語通論》。上海教育出版社。 7. 姜波（2009）《飛機檢測與維修實用手冊》（第1-4卷）。吉林：吉林科學技術出版社。 8. 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。

July 2014

Subject Description Form

Subject Code	EIE4112 (for 42470 and 48401)
Subject Title	Avionics Systems
Credit Value	3
Level	4
Pre-requisite	AAE3005 Introduction to Aircraft Design & Aviation Systems or EIE3331/EIE3381/EIE331/EIE381 Communication Fundamentals or ME45002 Aircraft Systems
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: 1. possess essential knowledge and skills in the area of avionics systems; 2. apply their knowledge, skills and hand-on experience to manufacture and maintain existing products; analyze and develop new modules and components in avionics systems for desired needs; 3. extend their knowledge of avionics systems to different situations of engineering context and professional practice.
Subject Synopsis/ Indicative Syllabus	**Regulatory Agencies & related documents:** ICAO Annex 10, FAA, RTCA; Concept of TSO; ARINC; DO-160. **Airborne Communications Systems:** VHF & HF transceivers, VDL modes; NAVCOM; EPIRB. **Terrestrial Radio Navigation & Landing Aids:** NDB**;** VOR; DVOR; DME; ILS & GP; Radar altimeters & AID. **Satellite Navigation:** Introduction to GNSS and its impacts on Performance-based navigation – RNAV & RNP. **Surveillance Systems:** Primary & Secondary Radars; ATCRBS replies; TCAS; ADS-B. **Cockpit Integration:** Display technologies; Instrument Placement. **On Board Data Buses:** ARINC 429; ARINC 629; ARINC 825 CAN Bus. **Electronic Flight Control:** FBW flight control features. Control laws. Safety and integrity. Redundancy and failure survival. Digital implementation and problems. Flight control software functions. **Case study:** • Case study on an avionics system/avionics subsystem/avionics component

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 avionics systems.

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

Teaching/Learning Methodology	**Intended subject learning outcomes**		
	1	**2**	**3**
1. Lecture	√	√	
2. Tutorial	√	√	
3. Homework assignment	√	√	
4. Case study report	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	**% weighting**	**Intended subject learning outcomes to be assessed**		
		1	**2**	**3**
1. Homework assignment	20%	√	√	√
2. Test	20%	√	√	
3. Case study report	20%	√	√	√
4. Examination	40%	√	√	√
Total	100%			

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

Overall Assessment:

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

The continuous assessment consists of three components: homework assignments, test, and case study report. 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	26 Hours
	• Tutorial	13 Hours
	Other student study effort:	

	• Self Study	44 Hours
	• Case Study	22 Hours
	Total student study effort:	**105 Hours**
Reading List and References	1. Helfrick A, Principles of Avionics, 7th Edition, Avionics Communications, 2012. 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.	
Last Updated	August 2017	
Prepared by	Dr Martin Chow	

The Hong Kong Polytechnic University

Subject Description Form

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

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.

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

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

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

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

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

The assessments will arise from a course-long engineering-related project. Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. They will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences.

Assessment type	Intended readers/audience	Timing
1. Project proposal in English Each team writes a proposal of 2000-2500 words; and each member writes a report of 200-250 words explaining his/her contribution to the project	Mainly engineering experts	Week 8
2. Oral presentation of project proposal in English Each team delivers a speech (30 minutes for a team of four), simulating a presentation of the final proposal	Mainly non-experts	Weeks 12-13

Student Study Effort Expected	Class contact:	
	Seminars	26 Hrs.
	Other student study effort:	
	Researching, planning and writing the project 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, *Contemporary business report writing*, 3rd ed., Cincinnati, OH: Thomson/South-Western, 2007. 4. M.S. Lawrence, *Writing as a thinking process: Teacher's manual*. Ann Arbor, Mich: University of Michigan Press, 1975. 5. D.C. Reep, *Technical writing: Principles, strategies and readings*, 6th ed., Pearson, Longman, 2006.	

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 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. Weekly summary reports iv. A report on Sustainable Development v. 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 and SD reports	(10%)	✓	✓	✓
2. Examination	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 open-book examination is used to assess students' critical thinking and problem-solving skills when working on their own.

Student Study Effort Expected

Class contact:	
▪ Lectures and review	27 Hrs.
▪ 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) August 2018

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	20%		✓	✓	
2. Mid Term Test	20%	✓	✓	✓	
3. Written examination	60%	✓	✓	✓	✓
Total	100%				

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

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

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

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 JR and Mantel SJ, 2010, *Project Management: a Managerial Approach*, Wiley, Hoboken NJ
2. Kerzner, H 2009, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling*, John Wiley, New York
3. Smith, NJ (ed.) 2008, *Engineering Project Management*, Blackwell, Oxford

(Revised) July 2015

Subject Description Form

Subject Code	ISE3009
Subject Title	Aviation Safety and Reliability
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	To provide students fundamental knowledge of aviation safety and to develop students' understanding of methods and techniques used in evaluating the reliability and safety of aviation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify major causes (such as human errors) of aviation accidents and responsibilities of civil aviation regulatory bodies; b. develop a system monitoring programme in accordance with the recommended procedure of HK Civil Aviation Department; c. explain the mathematical concepts used in reliability and safety analysis of aviation systems; d. formulate system reliability assessment to demonstrate compliance with airworthiness requirements.
Subject Synopsis/ Indicative Syllabus	***Aviation Accidents –*** Worldwide commercial aircraft accidents and their causes. Responsibilities of civil aviation regulatory bodies – HK Civil Aviation Department (HK CAD), Civil Aviation Administration of China, Federal Aviation Administration, Civil Aviation Authority, European Aviation Safety Agency. Safety Management System (SMS). ***Aviation Reporting systems*** – Legal framework. Reporting organizations. Occurrence Reporting. ICAO Accident/Incident Reporting System. Aviation Safety Reporting System. National Transportation Safety Board. ***Human Factors and Human Errors –*** Human errors as a major contributor to aircraft accidents worldwide. Basic concepts and principles of human factors including PEAR, the Dirty Dozen, SHELL and Reason models. Case studies of commercial aircraft accidents due to human errors by flight crew, ATC and maintenance personnel. ***Mathematical Concepts*** – Properties of continuous and discrete random variables. Parameter estimation of reliability distributions. Failure rates. Mean time between failures. Series and parallel redundancy. Conditional probabilities. Weibull analysis.

Reliability Assessment in Aircraft Systems – Design safety margins. System redundancy. FAA Fail-safe design concept. Probability and consequence of aviation failure conditions. Means for compliance with aircraft certification requirements.

Performance Monitoring – Safety Management Systems (SMS). Engineering performance of aircraft systems and components. Engine unscheduled shutdown. In-flight defects. Component unscheduled removals. Mechanical delays and cancellations. Statistical reliability measurement and HK CAD recommended alert establishment procedure.

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 d).

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

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 to d).

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓
Mini-project	✓	✓		
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	d
1. Assignments	20%	✓	✓	✓	✓
2. Group mini-project	10%	✓	✓		
3. Tests	20%	✓	✓		✓
4. Examination	50%	✓	✓	✓	✓
Total	100%				

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Overall Assessment: 0.50 × End of Subject Examination + 0.50 × Continuous Assessment 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, group mini-project, and test. 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, problem-solving, and effective communication skill in English so as to fulfill the requirements of working in the aviation industry.	
Student Study Effort Required	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial	9 Hrs.
	Other student study effort:	
	▪ Course work	20 Hrs.
	▪ Self-study	51 Hrs.
	Total student study effort	110 Hrs.
Reading List and References	1. Dhillon, Balbir S., *Safety and Human Error in Engineering Systems*, CRC Press, 2012. 2. Johnson, William, et al., *Human Factors for Aircraft Maintenance*, 2nd ed., Aircraft Technical Book Company, 2016. 3. O'Connor, Patrick D. T., and Kleyner, Andre, *Practical Reliability Engineering*, 5th ed., Wiley, 2011.	

Subject Description Form

Subject Code	ME37001
Subject Title	Fundamentals of Aerodynamics
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To develop students' knowledge in the fundamentals of aerodynamics. 2. To provide student's insight on airflow characteristics flowing through the aircraft. 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. Obtain fundamental knowledge in the area of aerodynamics primarily in inviscid and incompressible flow with viscous effect confined to boundary layers. b. Apply their knowledge, skills and hand-on experience to the analysis of aerodynamics, lift and drag on simple geometries and thin airfoils. c. Extend their knowledge of mechanical engineering to different situations of engineering context and professional practice in aerodynamics. d. Recognize the need for and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Introduction to Aerodynamics*** **-** aerodynamics variables, forces and moments; fluid statics; dimensional analysis and flow similarity; types of flow – continuum versus free molecule flow, inviscid versus viscous flow, incompressible versus compressible flow, Mach number flow regimes; an introduction to viscous boundary layers ***Fundamental Principles and Conservative Equations*** **-** control volume; continuity, momentum and energy equations; pathlines, streamlines, and streaklines of a flow; angular velocity, vorticity and strain; circulation; stream function and velocity potential. ***Inviscid, Incompressible Flow*** **-** Bernoulli equation; flow in a duct – venturi and low-speed wind tunnel; pitot tube measurement of airspeed; irrotational flow, 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 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; law on vortex motion; Prantdl's lifting line theory. ***Introduction to Compressible Flow*** **-** compressibility effects; elementary 1D compressible flow, shocks, expansion wave.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, homework assignments, test, and examination.

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 CFD projects are used to evaluate the lift and drag of streamline objects and airfoils.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Homework assignments	√	√	√	√
Tests	√	√	√	√
Exam	√	√	√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignments	10%	√	√	√	√
2. Tests	25%	√	√	√	√
3. Experiments/Projects	15%	√	√	√	√
4. Examination	50%	√	√	√	
Total	100%				

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

1. The assessment is comprised of 50% continuous assessment (homework, experiments/projects) and 50% examination.

2. The continuous assessment consists of homework assignments. 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 analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Lab/Project	6 Hrs.
	Other student study effort:	
	▪ Self Study	67 Hrs.
	Total student study effort	106 Hrs.
Reading List and References	1. Anderson J. D., Fundamentals of Aerodynamics. McGraw-Hill, latest edition. 2. Kuethe A. M., Chow C-Y, Fundamentals of Aerodynamics: Bases of Aerodynamic Design, John Wiley & Sons, Inc., latest edition.	

Revised August 2018

Subject Description Form

Subject Code	ME37002
Subject Title	Aircraft Structures and Materials
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To provide students key knowledge relevant to aircraft structures and materials. 2. To provide students an overview of the composites used in modern aircraft. 3. To provide students with stress analysis tools to formulate and solve 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 key aspects of aircraft structures. b. Analyze and assess aircraft structures subject to various types of loading using stress analysis tools and failure criteria. c. Comprehend characteristics of various materials used in aircraft. d. Understand mechanical behaviors of composite materials used in aircraft.
Subject Synopsis/ Indicative Syllabus	***Characteristics of Aircraft Structures*** **-** Aircraft structural elements. Wing, fuselage, tail and landing gear. ***Fundamentals of Aircraft Materials and Joints*** **-** Material fundamentals. Metallic alloys. Composites. Riveting. Aircraft fasteners. Adhesive joint. ***Stress Analysis*** **-** Stress and strain. Equations of equilibrium. Principal stresses. Linear stress-strain relations. ***Loads Applied on Aircraft*** **-** Compression and tension. Torsion. Bending. Membrane stresses in pressure vessels. Flexural shear in closed thin-walled sections. Buckling of columns. Loads and stresses on ribs and frames. Aircraft structures under combined loading. ***Failure Criteria for Isotropic Materials*** **-** Strength criteria for brittle materials. Yield criteria for ductile materials. Stress concentration. Fatigue. Fractures. Corrosion of materials and prevention. ***Heat Treatment Processes*** **-** Heat treatment of metals. Surface treatment. ***Fundamentals of Aircraft Composites*** **-** Mechanical behavior of composite materials. Processing and Fabrication techniques for aircraft composites.

Teaching/Learning Methodology

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

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Tutorials	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	√
2. Assignments and quiz	30%	√	√	√	√
3. Laboratory	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 and assignments 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	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. 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.

Revised August 2018

Subject Description Form

Subject Code	ME37003
Subject Title	Aircraft Propulsion Systems
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: ME37001 Fundamentals of Aerodynamics
Objectives	To provide students with knowledge of advanced aerodynamics and application in modern gas-turbine engines.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. obtain state-of-the-art knowledge in the area of aerodynamics and propulsion systems; b. apply their knowledge, skills and hand-on experience to the design and analysis of propulsion systems; c. extend their knowledge of mechanical engineering to different situations of engineering context and professional practice in propulsions systems; and d. recognize the need for and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Introduction to Propulsion*** **-** fluid momentum, reaction force, rockets, propellers, turbojets, turboprop, turbofans. ***Review of Thermo-fluids*** **-** mass, momentum and energy conservation laws; first and second laws; entropy equation; and perfect gas. ***Steady-state, One-dimensional (1D), Compressible Flow*** **-** Quasi-1D flow of perfect gas; isentropic and non-isentropic flow; constant area with friction and without friction with stagnation temperature variation; shocks; and expansion waves. ***Propulsion Basics*** **-** thrust equations, thermal and propulsion efficiencies, fuel consumption rate and specific thrust, aircraft range. ***Cycle Analysis and Engine Performances*** **-** ramjet, turbojet, turbofan, turboprop, and turbo-shaft engines. ***Turbomachinery*** **-** basics of compressors and turbines. ***Related Topics*** **-** Inlets, nozzles, and combustors; engine performance and aircraft-engine matching. ***Modern Aircraft Engines*** **-** High-by-pass engines, open rotor engines and green engines.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, homework assignments, test, and examination.

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

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

4. Experiments or CFD projects are designed to evaluate the propulsion system.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Homework assignments	√	√	√	√
Experiments/Projects	√	√	√	√
Tests	√	√	√	√
Exam	√	√	√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignments	10%	√	√	√	√
2. Projects/Experiments	15%	√	√	√	√
3. Tests	25%	√	√	√	√
4. Examination	50%	√	√	√	
Total	100%				

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

1. The assessment is comprised of 50% continuous assessment and 50% examination.

2. The continuous assessment consists of homework assignments. 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 analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Lab/Project	6 Hrs.
	Other student study effort:	
	▪ Self Study	67 Hrs.
	Total student study effort	106 Hrs.
Reading List and References	1. Hill P. and Peterson C., *Mechanics and Thermodynamics of Propulsion*., Addison Wesley, Inc. latest edition. 2. Sutton G. P., Biblarz O., R*FRocket Prropulsion Elements*, John Wiley & Sons, Inc. latest edition.	

March 2014

Subject Description Form

Subject Code	ME 37004
Subject Title	Flight Mechanics and Control
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To provide students with a basic understanding of flight performance, static and dynamic stability and feedback control.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate equations of motion of a rigid symmetric aircraft. b. Analyze equilibrium and stability for an aircraft. c. Explain the basic modes of motion and related mechanisms of an aircraft. d. Design a basic control system using simplified equations of motion.
Subject Synopsis/ Indicative Syllabus	***Introduction –*** Mathematical tools for flight mechanics and control, configuration aerodynamics, flight performance. ***Flight Dynamics –*** Aircraft equation of motion, static equilibrium and trim, lift and pitching moment, control force, static longitudinal and lateral stability, linearized equation of motion, longitudinal dynamics, lateral-directional dynamics, maneuvering flight. ***Flight Response –*** Transfer function and block diagram, open loop response, time response, frequency response, closed-loop control and stability, stability margins, Routh-Hurwitz stability criterion, root-locus analysis of parameter variations. ***Aerodynamic Stability and Control*** – Flying qualities requirements, stability and control derivatives, problems of longitudinal dynamics, problems of lateral-directional dynamics.
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 equation of motion for aircrafts, models of aircraft, and conditions for equilibrium, linearization 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 which is analyzed by using MATLAB toolbox. These experiments are designed to train students how to apply theories to practical applications, how to analyze and present experimental data.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
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	d
1. Test	20%	√	√	√	√
2. Homework assignment	20%	√	√	√	√
3. Laboratory	10%				√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

0.5 × End of Subject Examination + 0.5 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability to apply the concepts. It is supplemented by tests, assignments 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	35 Hrs.
	▪ Laboratory/Tutorial	4 Hrs.
	Other student study effort:	
	▪ Reading and review	42 Hrs.
	▪ Homework assignment	16 Hrs.
	▪ Laboratory report	8 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Cook, M. V., Flight Dynamics Principles, Elsevier, latest edition. 2. Etkin, B. and Reid, L. D., Dynamics of Flight, John Wiley, latest edition. 3. Yechout, T. R., Morris, S. L., Bossert, D. E., Hallgren, W. F., Introduction to Aircraft Flight Mechanics, AIAA, latest edition.	

March 2014

Subject Description Form

Subject Code	ME37010
Subject Title	Air Transport Operations
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide an overview of air transport operations to a diverse audience that has an interest in the development of careers in aviation and to develop students' understanding of the up-to-date operational concepts and practices.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand key aviation systems and their roles; b. identify and explain mandatory airworthiness requirements; c. describe the aviation environmental impact and published mitigating measures; d. explain the roles of the International Civil Aviation Organization and the International Air Transport Association in fostering safe and efficient air transport.
Subject Synopsis/ Indicative Syllabus	***Aviation Systems*** - An introduction to major aviation systems - civil aviation regulatory bodies, airlines, airports and aviation organisations. Economic contributions of the aviation industry and related businesses. ***Airline Organization*** - Air Operator's Certificate. Route planning. Engineering operations. Flight operations. Take-off and landing minima. Reduced vertical separation minima. 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. Operation and development of airport facilities. Air traffic controls. Aviation security and Runway system design. ***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 Organization (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 d).

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

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 d).

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

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

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	20%	√	√	√	√
2. Group mini-project	10%	√	√	√	√
3. Test	20%	√	√	√	√
4. Examination	50%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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, group mini-project, and test. 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	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Course work	21 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 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.	

March 2014

Subject Description Form

Subject Code	ME47010
Subject Title	Airworthiness
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AAE3005 Introduction to Aircraft Design and Aviation System; or ENG3005 Introduction to Aircraft Design and Aviation System; and ISE3009 Aviation Safety and Reliability
Objectives	This subject aims at providing students basic understanding of the aircraft airworthiness that has to be considered as a coherent process from the design of aircraft to the monitoring of its technical condition in airline service. Different airworthiness requirements for civil aircraft under CAA, FAA, JAR and ICAO regulations are introduced.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Familiarize aircraft airworthiness including both the technical aspects of certification and the legal and economic implications; b. Analyze types of certificate process, procedure and implementation; c. Understand aircraft maintenance procedures and certification process; d. Effectively communicate with aviation professionals with fluency in English and Chinese writing and speaking.
Subject Synopsis/ Indicative Syllabus	***General*** **-** Convention on International Civil Aviation; Annexes 1, 6, 7, 8, 16 and 19; State of Design, State of Manufacture, State of Registry and State of the Operator; Classification of aircraft; Registration of aircraft and Noise Certification. ***Type Certification of Aircraft*** **-** Design aspects of airworthiness requirements for aeroplanes, helicopters, engines and propellers in terms of Flight, Structure, Design and Construction, Tests and Inspection, Rotors and Powerplant, Systems and Equipment, Operating Limitations and Information, Crashworthiness and Cabin Safety, Operating Environment and Human Factors, and Security; Proof of compliance of applicable airworthiness requirements; Type Certificate; and Supplementary Type Certificate. ***Production*** **-** Aircraft Production; Production Approval. ***Certificate of Airworthiness*** **-** Issuance and continued validity of a Certificate of Airworthiness; Flight manual; Weight and balance of aircraft; and Temporary loss of airworthiness. ***Design and Manufacturing of Products Other Than Aircraft*** **-** Type validation/acceptance of engines and associated equipment; Design and production approval of aircraft equipment and accessories; Approval of radio apparatus; Parts Manufacturing Approval.

	Continuing Airworthiness of Aircraft **-** Responsibilities of Contracting States in respect of continuing airworthiness; Airworthiness Directives; and Aircraft leasing. ***Aircraft Maintenance*** **-** Maintenance Steering Group (MSG-3); Maintenance Review Board Report; Maintenance Planning Data; Maintenance Programme; Condition Monitoring and Reliability Programme; Modification and Repair; Certificate of Return to Service; Certificate of Maintenance Review; ***Changes to Type Design*** **-** Classification of modification and repairs; Flight testing; Certificate of Fitness for Flight; Permit to Fly; Responsibilities of Type Design organization and aircraft operator; changes to approved documents. ***Maintenance Support Arrangement*** **-** Air Operator Certificate; Operational Specifications; Maintenance Agreement; and Minimum Equipment List. ***Approval of Aircraft Maintenance Organization and Aircraft Maintenance Training Organization*** ***Licensing of Aircraft Maintenance Personnel*** ***In Service Reporting System*** ***The Chinese Vocabulary and Terminology in Air Transportation*** **-** Reading of various Chinese profession-related manuals, such as Aircraft Maintenance Manual (AMM, 飛機維修手冊), Illustrated Parts Catalog（IPC, 飛機件號手冊）, Fault Reporting Manual（FRM, 故障報告手冊）, Fault Isolation Manual（FIM, 故障隔離手冊）and Tool and Equipment Manual（TEM, 工具設備手冊 ）etc.# # "The Chinese Vocabulary and Terminology in Air Transportation" is taught by CBS academic staff.
Teaching/Learning Methodology	Lectures are used to deliver the knowledge of airworthiness to the students. Site visits will be arranged to provide them the real insight of aircraft maintenance procedure and airport operations. Industrial experts will be invited to share their experience and provide case studies to the students.
Assessment Methods in Alignment with Intended Learning Outcomes	<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. Examination</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>2. Assignment</td><td>10%</td><td>√</td><td></td><td>√</td><td>√</td></tr><tr><td>3. Reports and presentation (Case Study)</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

	Overall Assessment: 0.5 x End of Subject Examination + 0.5 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 English Session Chinese Session (CBS)	 20 Hrs. 10 Hrs.
	▪ Tutorials	9 Hrs.
	Other student study effort:	
	▪ Assignments	20 Hrs.
	▪ Report	60 Hrs.
	Total student study effort	119 Hrs.
Reading List and References	1. Hong Kong Aviation Requirements. 2. Airport Planning & Management. Edited by Alexander T. Wells, latest edition, McGraw Hill. 3. Aircraft Safety: Accident Investigations, Analyses & Applications. Edited by Shari Stamford Krause, latest edition, McGraw Hill. 4. 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。 5. 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。	

August 2017

Subject Description Form

Subject Code	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> • 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;

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

Practical appreciation of composites damage detection techniques including tap-test, UT A scan, and UT C scan;
Practical appreciation of damage removal and bonded repair techniques.

<u>Project management</u>

Use of aircraft repair manuals and other technical documentations;
Quality control and record-keeping practices;
Appreciation of computer-aided product data management (PDM).

</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>45</td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>2. Quizzes</td><td>15</td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>3. Performance of final product</td><td>20</td><td></td><td>X</td><td>X</td><td></td></tr>
<tr><td>4. 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 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.

Performance of final product, evaluated by product trials, QC checks, and supervisors’ inspection, will be used to assess how well the students exercise their engineering judgments, and how efficient they working as a team.
</td></tr>
</table>

	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	36 Hrs.
	▪ Project	84 Hrs.
	Other Study Effort	0 Hrs.
	Total Study Effort	**120 Hrs.**
Reading List and References	Reference Standards and Handbooks: 1. FAA-H-8083-30 Aviation Maintenance Technician Handbook – General Chapter 5: Aircraft Materials, Processes, and Hardware, 2008 2. FAA-H-8083-31 Aviation Maintenance Technician Handbook – Airframe Chapter 08 Aircraft Painting and Finishing, 2012 3. FAA-H-8083-31 Aviation Maintenance Technician Handbook – Airframe Chapter 04 Aircraft Metal Structural Repair, 2012 4. FAA-H-8083-31 Aviation Maintenance Technician Handbook – Airframe Chapter 07 Advanced Composite Material, 2012	

July 2017

Discipline-Specific Requirements (DSR)

Elective Subjects

Subject Description Form

Subject Code	AAE4001
Subject Title	Aviation 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. managing projects relating to the aviation industry
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; specifics of projects in the aviation industry; b. identify appropriate project variables and practices that are applicable to aviation projects; c. perform project planning, cost/resources estimation, evaluate and monitor of project progress; d. propose project management solutions, taking into consideration the project objectives and constraints in the scope of aviation projects.
Subject Synopsis/ Indicative Syllabus	1. <u>Overview of Aviation Project and Principles of Project Management</u> Characteristics of aviation projects. Project managementprinciples. Project organization. Team development. Systems concepts in project management. 2. <u>Project Methodologiesand Planning Techniques</u> Constraints: time, cost, and technical performance. Work breakdown structure. Management of scope. Scheduling tools: Gantt charts, network analysis techniques, CPM, PERT, and resource smoothing. 3. <u>Cost Estimationand Cost Control for Projects</u> Types of estimates. Budgeting project costs. Cost schedules and forecasts. Cost control systems. Impacts of cost control on aviation industry. 4. <u>Evaluation and Control of Projects</u> Evaluation of projects. Managing project risks and the impact towards aviation industry. Status reporting. Project closeout and termination, with exit plans.

Teaching/Learning Methodology

A mixture of lectures, tutorial exercises, case studies/project work is 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 relating to aviation industry. 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/ project	30%		✓	✓			
2. Mid Term Test	20%	✓	✓	✓			
3. Written examination	50%	✓	✓	✓	✓		
Total	100%						

Continuous assessment (1) & (2): Test, group project 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).

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

Student Study Effort Expected

Class contact:	
▪ Lectures/project3 hours/week for 9 weeks	27 Hrs.
▪ Tutorials 3 hours/week for 4 weeks	12 Hrs.
Other student study effort:	
▪ Preparation for assignments, test, group project, and the written examination	78 Hrs.
Total student study effort	**117 Hrs.**

Reading List and References

1. Meredith JR and Mantel SJ, 2010, *Project Management: a Managerial Approach*, Wiley, Hoboken NJ. (or latest edition)
2. Kerzner, H 2009, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling*, John Wiley, New York. (or latest edition)
3. Smith, NJ (ed.) 2008, *Engineering Project Management*, Blackwell, Oxford, latest edition. (or latest edition)
4. *Journal of Air Transport Management: An International Journal of Research, Policy and Practice. Elsevier. ISSN: 0969-6997. (selected articles).*

Subject Description Form

Subject Code	AAE4003
Subject Title	Airport Services Engineering
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject will provide students with 1. a broad understanding of the airport services in all phases of design and engineering to students; 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 optimize the airport operations costs and efficiency, including capacity determination, airport facility selection, facility layout, and facility planning; c. establish effective ground maneuvering such as airport geometry, terminal layout, aircraft configuration optimization.
Subject Synopsis/ Indicative Syllabus	1. <u>Runway Planning, Analysis and Maintenance</u> Airfield design and planning (runway, taxiway and apron), aircraft runway length and takeoff weights, pavement strength and condition, Development of Allowable Load Determination and Pavement Classification Number (PCN), airport elevation, temperature, runway slope, obstacles, bird control, Foreign Object Debris, rubber removal, runway inspection. 2. <u>Airport Facility Planning and Engineering</u> Airport layout. Design of terminal facilities, baggage handling facilities, freight facilities, layout planning and optimization, ground support equipment and equipment selection, basic queuing theory and simulation (e.g., simulation of passenger flow for choke point analysis). 3. <u>Air Traffic Flow and Capacity Management</u> Ground Delay Program (GDP): Delay Assignment (DAS) mode, General Aviation Airport Program (GAAP), Unified Delay Program (UDP) mode. Peak-hour analysis (design peak hour and forecast). D*emand* 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).

4. Ground Maneuvering and Gate Planning

Ground operations, ground maneuvering, gate operations, and terminal servicing including:

- airport geometry for operating new and existing airplane models.
- terminal layouts and gate arrangements.
- aircraft configuration optimization.

Teaching/Learning Methodology

Teaching is conducted through class lectures and case studies/laboratory exercises. Both the basic knowledge and theoretical models are going to be introduced. The understanding of how to address problems by using scientific tools is emphasized. Normally, examples of problem-solving techniques are taught in class and related scenarios are provided to students to enhance their application abilities. Laboratory exercises and short reports 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			
Examination	50%		✓	✓			
Laboratory/Case Study	30%		✓	✓			
Report	20%	✓	✓	✓			
Total	100%						

By the end of each laboratory exercise, a written report is required to be submitted to show the findings. 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. At the end of the semester, an examination is given to students to assess their learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture/Seminar	24 Hrs.
▪ Laboratory/Case Study/Visit	15 Hrs.
Other student study effort:	
▪ Assignment/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)

Subject Description Form

Subject Code	AAE4101
Subject Title	Aviation Power Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge of electrical power systems, application of power electronics, industry practice in aircraft and space.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. acquire good understanding of electrical power systems in aircraft. b. acquire good understanding of electrical power distribution in aircraft. c. acquire the knowledge of applying power electronics in aviation.
Subject Synopsis/ Indicative Syllabus	1. **Aircraft Electrical Generation Systems:** role of electrical power systems, electrical power sources and loads, power conversion, voltage and frequency regulation, synchronization and load shedding, power management. 2. **Aircraft Electrical Distribution and Protection:** evolution of aircraft electrical system, more electric equipment & system, power distribution and protection systems, no-break power transfer, load shedding, case studies. 3. **Aircraft power electronics:** AC/DC conversion, DC/DC conversion, TRU, VSCF, Auxiliary power unit. 4. **Backup power:** Battery system, charger, backup generator, Backup converter 5. **Power utilization:** Lighting, Heating, ventilation, entertainment system, Avionics system
Teaching/Learning Methodology	1. The teaching and learning methods include lectures/tutorials sessions, homework assignments, tests, case study reports/presentations, and examination. 2. The continuous assessments and examination are aimed at providing students with integrated knowledge required to understanding the impact on environment from the aviation industry and the related mitigation measures.

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

Teaching/Learning Methodology	Intended Learning Outcomes			
	a	b	c	
1. Lecture	✓	✓	✓	
2. Tutorial	✓	✓	✓	
3. Homework assignments	✓	✓	✓	
4. Case study report and presentation		✓	✓	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignments	10%	✓	✓	✓
2. Test	20%	✓	✓	✓
3. Case study	10%		✓	✓
4. Examination	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

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

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

Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial/Case Study	13 Hrs.
	Other student study effort:	
	▪ Self Study	36 Hrs.
	▪ Homework Assignments	15 Hrs.
	▪ Case Study Report Preparation	15 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Pallett, Aircraft Electrical Systems, Pearson Education, 1 Sep 2006. 2. David Wyatt, Mike Tooley, Aircraft Electrical and Electronic Systems, Routledge, 4 Jun 2009. 3. Thomas K. Eismin, Aircraft Electricity & Electronics, McGraw-Hill, 2013. 4. A. Emadi, M. Ehsani, and J.M. Miller, "Vehicular Electric Power Systems", Marcel Dekker, Inc., New York, 2004.	

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 or ME37002 Aircraft Structures and Materials
Objectives	1. To provide students with knowledge of mechanical behavior of composite materials used in aircraft. 2. To provide students with understanding of the processing, fabrication and influence of fabrication and environment on properties of aircraft composites. 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. Analyze 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 optimization. Engineering applications of composites.

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	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓
Experiment	✓	✓		

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		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.	

Subject Description Form

Subject Code	AAE4106
Subject Title	Aircraft Gas Turbine Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE3003 Aircraft Propulsion Systems; or ME37003 Aircraft Propulsion System
Objectives	To provide students with knowledge of advanced aircraft gas turbine engine systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. obtain state-of-the-art knowledge in the area of advanced aircraft gas turbine engine systems; b. understand the role and significance of gas turbine engine systems; c. explain the operating principles of advanced aircraft gas turbine engine systems; and d. apply their knowledge, skills and hand-on experience to the design, analysis and operation of aircraft gas turbine engine systems.
Subject Synopsis/ Indicative Syllabus	**Introduction to Aircraft gas turbine engine systems –** Revision of principle of engine fuel control systems: Purpose of the engine fuel system and layout of typical system components, factor governing fuel requirements, requirements of the engine fuel system, engine fuel system components and system diagram, including fuel pumps, fuel flow control, hydro-mechanical control units, engine protection devices, burners. **Electronic engine control systems:** Principle and requirements of electronic engine control systems. **Engine air systems:** Internal Cooling Airflow, Sealing, Cooling, Turbine Case Cooling –Description and Operation, HP Air for Aircraft Services, Anti-Icing. **Starting and ignition systems:** Principle, requirements and operation of Gas Turbine Engine Starting Systems, Ignition Systems. **Engine indication Systems:** Principles and requirements of engine speed indicators, thrust indication, exhaust gas temperature, fuel flow metering, oil, vibration, warning lights. **Thrust Augmentation:** Purpose, principles and operation of thrust augmentation systems including water injection, water methanol and re-heat (after burning). **Turbo-Prop engines:** Design and arrangement, Types of Turbo-Prop engines, Reduction Gearing, Turbo-Prop Performance, Engine Control systems including engine and propeller controls, Integrated engine and

propeller controls, over-speed safety devices.

Turbo shaft Engines: Design and arrangement, Turbo-shaft performance, Drive Systems, reduction gearing, Couplings, and engine control systems.

Auxiliary Power Units: Purpose, operation, protective systems. Design of the APU Engine, General Arrangements and Configuration, Fuel Control, APU oil System, APU Bleed Air Systems, Bay Cooling, APU Powerplant Installation, APU Starting Sequence.

Engine Fire Protection System: Principle and designs of Engine Fire Protection Systems.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, tutorial sessions, homework assignments, test, case study reports and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced gas turbine engine and its associated systems.
3. Technical/practical examples and problems are raised and discussed in class.
4. Special lecture(s) delivered by invited industrial professionals may be used to complement the concepts learnt in class to engineering practices. Students are expected to achieve better understanding of significance and applications of advanced gas turbine system through this activity.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Tutorials	√	√	√	√
Homework assignments	√	√	√	√
Tests	√	√	√	
Examination	√	√	√	

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	30%	√	√	√	√
2. Tests	20%	√	√	√	√
3. Examination	50%	√	√	√	
Total	100%				

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

1. The assessment is comprised of 50% continuous assessment and 50% examination.
2. The continuous assessment consists of homework assignments. 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 analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self Study	67 Hrs.
	Total student study effort	106 Hrs.
Reading List and References	1. Hill P. and Peterson C., *Mechanics and Thermodynamics of Propulsion*., Addison Wesley, Inc. latest edition. 2. Sutton G. P., Biblarz O., R*FRocket Prropulsion Elements*, John Wiley & Sons, Inc. latest edition.	

Jan 2018

Subject Description Form

Subject Code	AAE4302
Subject Title	Aircraft Electronics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2902S Fundamentals of Electrical and Electronic Engineering or AAE3005 Introduction to Aircraft Design and Aviation Systems
Objectives	To provide students with essential knowledge of aircraft electronics.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. possess essential knowledge and skills in the area of aircraft electronics; 2. apply their knowledge, skills and hand-on experience to maintain and perform diagnosis on existing aircraft electronics systems; 3. extend their knowledge to analyze and develop new modules and components in aircraft electronics for desired needs.
Subject Synopsis/ Indicative Syllabus	**Essential Electronics Devices** Switches; Transistors; Amplifiers; Logic gates; Interfacing of microprocessors; Power sources and supplies, Voltage regulation and distributions; Digital electronics and data bus; troubleshooting techniques & basic instrumentations. **Radio Electronics** Practical approach to transmission lines and characteristic impedance; VSWR; basic concept of antennae and their installation; calibration techniques of modulation depth; measurement techniques of aeronautical transceivers. **Display Technologies** Raster scanning principle; CRT; LCD and their relationship to onboard instrumentations. **Electromagnetic Compatibility** Introduction to EMI and EMC and their related standards. Case studies on various **Sensors** used onboard

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

Teaching/Learning Methodology	Intended subject learning outcomes		
	1	2	3
1. Lecture	✓	✓	
2. Tutorial	✓	✓	
3. Homework assignment	✓	✓	
4. Case study report	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		1	2	3
1. Assignments	20 %	✓	✓	
2. Test	20 %	✓	✓	
3. Case study	20 %	✓	✓	✓
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

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 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	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. Thomas K. Eismin, Aircraft electricity and electronics, McGraw-Hill Education, 2014. 2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009. 3. Jon B. Hagen, Radio-frequency electronics: circuits and applications, Cambridge University Press, 2009. 4. Dale Stacey, Aeronautical radio communication systems and networks, J. Wiley, 2008. 5. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011.	

Subject Description Form

Subject Code	AAE4305
Subject Title	Advanced Electronics Instrumentation and Control - Flight Management Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE4302 Aircraft Electronics
Objectives	To provide students with essential knowledge of electronics instrumentation and control with emphasis on Flight Management Systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. possess essential knowledge and skills in the area of electronics instrumentation and control; 2. apply their knowledge, skills and hand-on experience to maintain and perform diagnosis on existing flight management systems; 3. extend their knowledge to analyze and develop new modules and components in electronics instrumental and control for desired needs.
Subject Synopsis/ Indicative Syllabus	**Aerodynamics and Aircraft Control** Revisit of aircraft stability and dynamic; longitudinal and lateral control; powered flying control and stability augmentation. **FBW** Basic concept and features of Fly-By-Wire and the associated sensors, e.g., MEMS, modern gyroscopes, accelerometers, and actuators, e.g., servo motors and amplifier; Control laws; Redundancy and failure survivals. **Autopilots and Flight Management Systems** Flight Management Computer FMC and Control Display Unit CDU; Electronic Flight Information System EFIS (Primary Flight Display PFD and Navigation Display ND); Auto Flight System AFS (Autopilot, Flight Director, Auto throttle) Case studies on **Avionics Systems Integration**
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 electronics instrumentation and control.

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

Teaching/Learning Methodology	Intended subject learning outcomes		
	1	2	3
1. Lecture	✓	✓	
2. Tutorial	✓	✓	
3. Homework assignment	✓	✓	
4. Case study report	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		1	2	3
1. Assignments	20 %	✓	✓	
2. Test	20 %	✓	✓	
3. Case study	20 %	✓	✓	✓
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

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 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	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. David Wyatt, *Aircraft flight instruments and gui dance systems: principles, operations, and maintenance*, Routledge, 2014. 2. Thomas R. Yechout et al, *Introduction to aircraft flight mechanics : performance, static stability, dynamic stability, classical feedback control, and state-space foundations,* 2nd Edition, AIAA 2014 3. Collinson R.P.G, *Introduction to Avionics Systems,* 3rd Edition, Springer 2011. 4. *Pilot's Handbook of Aeronautical Knowledge*, U.S. Department of Transportation, FAA, Flight Standards Service, 2008. 5. Edited by Cary R. Spitzer, *The avionics handbook,* CRC Press, 2001.	

Subject Description Form

Subject Code	AAE4902
Subject Title	Pilot Ground Theory
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE2001 Introduction to Aircraft and Aviation Systems or AAE3005 Introduction to Aircraft Design and Aviation Systems
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. 2. To familiarize student with the use of aeronautical information services, government references and publications for flight planning and navigation purposes. 3. To teach students aeromedical factor and pilot decision-making to improve pilot's performance. 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. b. Efficiently utilize aeronautical information services, government references and publications for flight planning and navigation purposes. c. Recognize the influence and importance of human factor and human performance on flight safety. 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 p ilot'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 familiarize 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). Experiments, likely in the form of flight simulation, are used to relate the concepts to practical applications and evaluation of flight performance (outcomes a, b and d).

Teaching and Learning Methodology	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial		✓	✓	
Homework assignments	✓	✓	✓	✓
Experiment	✓	✓		✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Homework assignments	15%	✓	✓	✓	✓
2. Test	15%			✓	✓
2. Experiment	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

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. The experiment, likely in the form of flight simulation, is designed and aimed to provide students with a taste of flying as a pilot in a safe controlled environment, while at the same time allowed the individual pilot ground theory skills to be evaluated. 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.	

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	***Human Factors: Basic Concepts*** **-** Human factors in aviation, Accident statistics, Flight safety concepts, Safety culture. ***Basic Aviation Physiology*** **-** Basics of flight physiology, The atmosphere, Respiratory and circulatory system, High-altitude environment Central, peripheral and autonomic nervous systems, Vision, Hearing, Equilibrium, Integration of sensory inputs. ***Health Maintenance*** **-** Health and hygiene, Personal hygiene, Body rhythm and sleep, Problem areas for pilots, Intoxication, Incapacitation in flight. ***Basic Aviation Psychology*** - Human information processing, Attention and vigilance, Perception, Memory, Response selection, Human error and reliability, Reliability of human behavior, Mental models and situation awareness, Theory and model of human error, Error generation, Decision-making, Avoiding and managing errors: Safety awareness, Coordination (multi-crew concepts), Cooperation, Communication, cockpit management: Personality, attitude and behavior, Individual differences in personality and motivation, Identification of hazardous attitudes (error proneness), Human behavior: Arousal, Stress, Fatigue and stress management, Human overload and underload, Advanced cockpit automation: Advantages and disadvantages, Automation complacency, Working concepts.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation systems (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 human factors through this activity (outcomes a and c).

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lecture	✓	✓	✓
Tutorial	✓	✓	✓
Mini-project	✓	✓	✓
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	20%	✓	✓	✓
2. Group mini-project	10%	✓	✓	✓
3. Test	20%	✓	✓	✓
4. Examination	50%	✓	✓	✓
Total	100%			

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

Overall Assessment:

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

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, group mini-project, and test. 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	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Course work	21 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Salas, Eduardo, Florian Jentsch, and Dan Maurino, eds. Human factors in aviation. Academic Press, 2010. 2. Oxford ATPL Manual 8 - Human Performance & Limitations - EASA, 1st Edition, 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. Ashgate, latest edition.	

October 2017

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; b. identify all the weather information which may affect a given flight; 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 engineering practices. Students are expected to achieve better understanding of human factors through this activity.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
1. Lecture	√	√	√	√
2. Tutorial	√	√		
3. Homework assignment	√	√	√	√
4. Case study report	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	15%	√	√	√	√
2. Test	15%	√	√	√	√
3. Case study 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 End of Subject Examination + 0.50 Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, and case study report. 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	33 Hours
	▪ Tutorial	6 Hours
	Other student study effort:	
	▪ Self-Study	44 Hours
	▪ Case Study	22 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.	

October 2017

Subject Description Form

Subject Code	ISE4014
Subject Title	Aircraft Service Engineering and Logistics
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject will enable students to 1. estimate failure rate of aircrafts; 2. evaluate aircraft reliability; 3. schedule an optimal maintenance plan for aircrafts; 4. maintain fleet readiness; 5. apply principles of quality assurance, quality control, and reliability standards for aircraft services.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand and apply different methodologies in aircraft maintenance, such as condition monitored, on-condition and scheduled maintenance process; b. understand and apply different scheduling methodologies to plan and design fleet aircraft maintenance schedule to maximize aircraft reliability and availability.
Subject Synopsis/ Indicative Syllabus	1. <u>Fundamentals of Maintenance</u> Aircraft Reliability; Types of Maintenance; Failure Rate Patterns; Aircraft Ageing; Technology in Aircraft Maintenance. 2. <u>Development of Maintenance Program</u> Process-Oriented Maintenance; Task-Oriented Maintenance; Maintenance Program Documents; Line Maintenance Operations and Schedule; Aircraft Logbook. 3. <u>Aircraft Maintenance Management</u> Role of Management in Aviation; Aircraft Maintenance Management Structure; Aircraft Maintenance Planning and Scheduling; Management Area of Concerns in an Airline; Cost of aircraft maintenance; Implementing Human Factors in

<table>
<tr><td></td><td>Maintenance.

4. <u>Aviation Industry Certification Requirements</u>

Aircraft Maintenance Engineer; Aircraft certification; Delivery Inspection; Operator certification; Certification of Personnel; Aviation Maintenance certification; JAA joint certifications; National certifications; FAA type certification.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mixture of lectures, tutorials, and projects are used to deliver the various topics in this subject. Some materials are covered in a problem-based format, exercise, and assignments to enhance learning effectiveness. Others will be covered through directed study in order to enhance the students' ability of "learning to learn." Some case studies, mainly based on business and industrial experience, are used to integrate these topics and thereby demonstrate to students how the various principles and techniques are inter-related and how they apply in real-life situations.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td></td><td></td><td></td><td></td></tr>
<tr><td>1. Laboratory work</td><td>10%</td><td>✓</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.In-class Assignment</td><td>10%</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Individual Assignment</td><td>20%</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4. Group Project</td><td>30%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5. Test</td><td>30%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>

The assignments are designed to assess students' understanding about the knowledge of aircraft maintenance and certifications.

The tutorials and exercises are designed to assess students' understanding of analyzing reliability and failure rate patterns.

The projects and case studies are designed to assess students' understanding of the working principles in the development of maintenance program and management.

The test is designed to assess students' understanding of the topics and whether they can present the concepts clearly.</td></tr>
</table>

Student Study Effort Expected	Class contact:	
	▪ Lectures	21 Hrs.
	▪ Tutorials	18 Hrs.
	Other student study effort:	
	▪ Assignments and exercises	25 Hrs.
	▪ Self-learning and practice for projects	30 Hrs.
	▪ Test preparations	25 Hrs.
	Total student study effort	119 Hrs.
Reading List and References	1. Kinnison, Harry A. 2013, *Aviation Maintenance Management*, McGraw-Hill 2. Friend, C.H. 1992, *Aircraft Maintenance Management*, Longman 3. Florio, Fillppo De 2006, *Airworthiness An Introduction to Aircraft Certification*, A Guide to Understanding JAA, EASA, and FAA Standards 4. Kroe, Micheal J., Watkins, William A., and Delp, Frank 2013, *Aircraft Maintenance and Repair*, Seventh Edition, McGraw-Hill Professional 5. Salas, Eduardo, Jentsch, Florian, and Maurino, Dan 2010, *Human Factors in Aviation*, Academic Press	

Subject Description Form

Subject Code	ISE4016
Subject Title	Data Management and Operational Research
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	The subject will enable students to develop the ability to 1. describe the basic concepts and methods of data management and operational research; 2. formulate models for quantitative analysis of managerial problems; 3. derive the data requirements of an operational research project; 4. identify the major applications and limitations of data management for operational research data; 5. apply data management techniques and tools for Operational Research projects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand the basic principles of data management and operational research; b. convert a managerial decision problem into a model formulation; c. formulate a data management plan for operational research projects; d. apply data management and operational research tools in operational research context.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction to Data Management and Operational Research</u> Why Data Management and Operational Research are needed; the data life cycle, data sharing requirements, naming conventions, metadata, storage, data ownership, security, privacy, and long-term access, basic concepts in operations research and mathematical modeling 2. <u>Data Warehousing and OLAP</u> Introduction to data warehouse; Data warehouse components; Building data warehouse; On-Line Analytical Processing (OLAP); Patterns and models.

<table>
<tr><td></td><td>3. <u>Modeling and Analysis Techniques for Operational Data</u>

Data preprocessing, Association; Classification; Clustering; Weka; Cases studies drawn from industrial and business applications.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>A mix of lectures, tutorials, and lab sessions is used to deliver the various topics in this subject. Lectures are conducted to introduce students to theoretical concepts and techniques. Some topics are covered in a problem-based format to enhance learning objectives. Lab sessions will be used to illustrate practical application of theories and techniques. Students are given the opportunity to gain hands-on experience on operating Data Management tools during the laboratory sessions.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1. Project</td><td>35%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Lab exercise</td><td>35%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Presentation</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>4. Quiz</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>
Continuous assessments consist of a project, lab exercises, presentation, and quizzes that are designed to facilitate students to achieve the intended learning outcomes. Lab exercise is designed to encourage students to acquire deep understanding of the relevant knowledge from hands-on practice. Project is designed to enhance students' ability to holistically apply what they have learnt in the context of a real problem through team work. Presentation is designed to facilitate students to show ability to communicate complex concepts clearly. Quiz is designed to test students' understanding and application of theoretical concepts and techniques acquired.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures 3 hours/week x 6 weeks</td><td>18 Hrs.</td></tr>
<tr><td>▪ Lab., presentation, test 3 hours/week x 7 weeks</td><td>21 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Preparation for the lab reports, presentations and quizzes
▪ Preparation for quizzes, and self-study</td><td>41 Hrs.
40 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
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Reading List and References	1. Han JW, Kamber M, and Pei J 2011, *Data Mining: Concepts and Techniques*, 3rd ed., Morgan Kaufmann Publishers 2. Tan, P, Steinbach M and Kumar V 2006, *Introduction to Data Mining*, Addison Wesley 3. Berson A, and Dubov L 2010, *Master Data Management And Data Governance*, 2nd ed., McGraw-Hill 4. Taha, H A 2007, *Operations Research*, 8th edn, Pearson 5. Taylor, B W III 2012, *Introduction to Management Science*, 11th edn, Prentice Hall 6. Winston, W L 2011, *Microsoft® Excel® 2010: Data Analysis and Business Modeling*, 3rd ed., Microsoft Press 7. Hillier, F S and Lieberman, G J 2010, *Introduction to Operations Research*, 9th edn, McGraw-Hill

Subject Description Form

Subject Code	ISE518
Subject Title	Workflow Design and Management
Credit Value	3
Level	5
Pre-requisite/Co-requisite/Exclusion	No prerequisite but some background knowledge on workflow and management is preferred.
Objectives	This subject provides students with 1. the knowledge to analyze and redesign existing systems, and to design new work systems in various industrial and commercial environments in order to improve productivity; 2. the knowledge to apply relevant techniques and problem-solving methodologies so as to enable them to manage projects concerned with productivity improvement successfully; 3. the knowledge and techniques to analyze a new or existing layout in order to achieve improvement; 4. the ability to recognize the need for, and problems associated with, change in organizations.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. examine and measure productivity in a typical manufacturing or service organization in order to improve it; b. identify the differences between cause and effect in problem solving and apply suitable problem-solving techniques using both analytical and creative (or lateral) thinking; c. examine an existing work situation and conduct a work improvement program in a manufacturing or service organization in order to identify low productivity; d. recognize the objectives of facility location and layout planning in both manufacturing and service organizations to evaluate different locations, the effectiveness of different layouts, and use suitable techniques for improvement; e. understand the need for change in organizations and be able to apply appropriate strategies to affect change in an appropriate manner.
Subject Synopsis/ Indicative Syllabus	1. <u>Productivity</u> The importance of productivity and its measurement; Productivity

	measures in organizations; Total and partial productivity measures, their advantages and limitations; Causes of low productivity in organizations; Types of productivity improvement programs and how to select them. 2. <u>Problem Solving</u> General problem-solving skills; Recognizing and defining problems; Use and applications of analytical and creative thinking; Barriers to creativity; Methods of stimulating creative thinking, such as attribute listing, analogy, brainstorming, etc. 3. <u>Work Improvement</u> Analysis and improvement of work methods, systems, and procedures; Selecting areas appropriate for work improvement; Choosing areas for improvement, recording the facts, examining, and developing improvements; Issues of implementation, and continuous improvement; Application to the analysis and improvement of work systems; An appreciation of Business Process Re-engineering (BPR) and continuous improvement, as approaches to improving work systems in organizations. 4. <u>Location and Facility Planning</u> Factors affecting the choice of location and the evaluation of alternatives; Types of layouts, including an appreciation of the systematic layout planning approach; Use of computers in layout planning; Types of flow lines, and line balancing issues. 5. <u>Management of Change</u> Introduction to managing changes in organizations; Problems associated with change and the effects that change has on the management and personnel concerned; Organizing for change and overcoming resistance to change.
Teaching/Learning Methodology	Emphasis is placed on a student-centered learning approach through a variety of case studies taken from realistic industrial and commercial situations. These case studies are often used to deliver the subject material in a scenario of problem-based learning that will integrate topics contained in the syllabus so as to make the subject material more interesting and meaningful to students. <u>Typical Case Studies</u> • Measuring productivity in an engineering company • Selecting areas for methods improvement in a small batch manufacturing company • Designing a flow-line to assemble a typical consumer product • Developing a home delivery service for a supermarket chain • Locating a centralized processing plant for a fast-food operation

- Creating a layout of a manufacturing department that integrates both production equipment and office accommodation
- Managing change in a commercial enterprise

Teaching/Learning Methodologies	Intended Subject Learning Outcomes to be assessed				
	a	b	c	d	e
Lecture	✓	✓	✓	✓	✓
Tutorial		✓		✓	✓
Project/case studies	✓	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% Weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
Continuous assessment	45%	✓	✓	✓	✓	✓
Examination (open book)	55%	✓		✓	✓	✓
Total	100 %					

Continuous assessment is comprised of case studies with individual and group components. Note: Assessment of Intended Learning Outcomes (ILOs) may vary from year to year in terms of whether they are by continuous assessment or by examination. However, all ILOs are covered each year. Moreover, all assessment components require students to apply what they have learned to realistic work applications that often integrate the various topics covered. The examination (open-book format) is also applications oriented.

Student Study Effort Expected

Class contact:		
▪ Lecture	3 hours/week for 7 weeks	21 Hrs.
▪ Tutorial/case study	3 hours/week for 4 weeks	12 Hrs.
▪ Laboratory	3 hours/week for 2 weeks	6 Hrs.
Other student study effort:		
▪ Studying and self learning		40 Hrs.
▪ Case studies and report writing		26 Hrs.
Total student study effort		105 Hrs.

Reading List and References

1. Adedeji B. Badiru and Olufemi A. Omitaomu 2011, *Handbook on Industrial Engineering equations, formulas and calculations*, CRC Press

2. Tristan Boutros and Tim Purdie 2014, *The Process Improvement*

Handbook: a Blueprint for Managing Change and Increasing Organizational Performance, McGraw-Hill Education

3. Layna Fischer 2005, *Workflow Handbook 2005*, Future Strategies

4. Imre Hegedus 2012, *Business Process Management: Strategies to Improve Performance*, Ark Group

5. Ricky W. Griffin 2013, *Management*, South-Western/Cengage Learning

6. James A. Tompkins, John A. White, Yavuz A. Bozer and J.M.A. Tanchoco 2010, *Facilities Planning*, 4th, Wiley

7. Alberto Garcia-Diaz and J. MacGregor Smith 2008, *Facilities Planning and Design*, Pearson/Prentice Hall

8. Gavriel Salvendy 2007, *Handbook of Industrial Engineering*, John Wiley & Sons, Third Edition Published Online

9. Raybould, E, R and Minter, A, L. 1992, *Problem Solving for Management*, Institute of Management Services, Latest Edition

10. Tomkins, White, Bozer, Frazelle, Tanchoo, Trevino. 2010, *Facilities Planning*, 4th edn, John Wiley & Sons Inc.

11. International Labour Office 1992, *Introduction to Work Study*, 4th edn

12. Lawrence, P (Editor) 1997, *Workflow Handbook*, John Wiley & Son, Chichester

13. Stefan Joablonski and Christoph Bussler 1996, *Workflow Management - Modeling Concepts, Architecture and Implementation*, International Thomson Computer Press

14. Poyssick, G and Hannaford, S. 1996, *Workflow Reengineering*, Adobe Press, Mountain View, California