THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Interdisciplinary Division of Aeronautical and Aviation Engineering

Bachelor of Engineering (Honours)
in
Aviation Engineering
航空工程學(榮譽)工學士學位

Programme Code: 48402
(Full-time Credit-based)

Definitive Programme Document
(For 2017/18 cohort)

Updated in August 2019

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This Definitive Programme Document is applicable for 2017/18 intakes. It is subject to review and changes which the Programme Host Division can decide to make from time to time. Students will be informed of the changes as and when appropriate.

PART A PROGRAMME SCHEME

1. General Information

1.1 Introduction

Programme Title	Bachelor of Engineering (Honours) in Aviation Engineering 航空工程學(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 (EE) • Department of Electronic and Information Engineering (EIE) • Department of Industrial and Systems Engineering (ISE) • Department of Mechanical Engineering (ME)
Programme Structure	Credit-based
Mode of attendance	Full-time
Duration	Normal: 4 years (8 semesters) Maximum: 8 years (16 semesters)
Final Award	Bachelor of Engineering (Honours) in Aviation Engineering 航空工程學(榮譽)工學士學位
Credits required for graduation	(a) Academic Credits: Exact number of credits depends on the academic background of students: • **124 credits** for HKDSE students who have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics); non-local students from the Chinese Mainland who have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities and; other students who possess the equivalent qualifications. • **127 credits** for students who do not possess the above background. (b) Training Credits: **10** (c) Work-Integrated Education Training Credit: **1**
Implementation Year	The first intake started in September 2016

1.2 Characteristics

The programme has the following characteristics:

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

In this programme, students receive a broad-based knowledge of science and engineering in the first year which will prepare them to lay a strong foundation to learn aviation engineering related subjects in the upper years. In the second year, they will acquire basic knowledge in aircraft and aviation systems and also have hands-on experience in aircraft component manufacturing processes. In the third year, students will embark on more advanced subjects such as aircraft design, safety, control, propulsion systems and project management. In the final year (ie. the fourth year of the normal study pattern), they have the opportunity to focus study on a chosen stream to acquire specialized knowledge in a specific area of aviation engineering. Possible study streams include (a) Aircraft Services Engineering; (b) Aerial Vehicle Autonomy and (c) Aircraft Avionics.

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

1.3 Minimum Entrance Requirements

For entry with HKDSE qualifications

The general minimum entrance requirements are as follows:

HKDSE Subjects	Core Subjects				Elective Subjects (including M1/M2)	
	Chinese Language	English Language	Mathematics	Liberal Studies	1st Elective	2nd Elective
Level Requirement	3	3	2	2	3	3

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

- Information and Communication Technology;
- All single and combined science subjects; and
- Extended modules of Mathematics.

Satisfactory performance in preferred subjects will have a positive influence on admission selection. However, applicants who have not taken the preferred subjects will still be considered for admission but they may need to take relevant underpinning subjects after admission to PolyU to gain the necessary foundation knowledge.

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

- E in 3 A-Level subjects OR E in 2 A-Level and 2 AS-Level subjects;
  AND
- Satisfy the English Language Requirement.

For those who are applying on the basis of IB

- A minimum score of 24 with at least grade 4 in 2 Higher Level (HL) subjects;
  AND
- Satisfy the English Language Requirement.

For those who are applying on the basis of other qualifications

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

For applicants with A-Level/IB qualifications, or the equivalent, they may be granted a maximum of 25% credit transfer for the award requirement, and each case will be considered based on individual merits.

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. While the number of exchanges is limited, students are encouraged to participate to enhance their all-roundedness and broaden their experience.

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

1.5 External Recognition

The programme will seek professional recognition from the Hong Kong Institution of Engineers (HKIE) and the Royal Aeronautical Society (RAeS).

1.6 Tuition Fee

Subject to revision, the tuition fee is currently at HK$42,100 per academic year.

1.7 Summer Term Teaching

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

1.8 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 global aviation industry is growing at a rapid pace. Asia, especially China, is the key contributor and stakeholder in this growth. The worldwide demand for qualified engineers for this industry is enormous and imminent. Different forecast reports worldwide have expressed the concern for the serious shortage of pilots and engineers that will affect the growth of this industry.

The serious shortage of qualified engineers for the aviation industry has become a bottleneck for the sustainable growth of the aviation industry, which is a critical industry for Hong Kong. Unfortunately, there is yet a comprehensive academic programme in the field of aviation engineering offered by any university in Hong Kong that covers both hard and soft core knowledge of the aviation discipline. The launching of the proposed 4-year programme by PolyU is definitely a timely move to address the needs of the industry.

The programme aims at training students to become engineers with a broad understanding of both the engineering and management operation in the aviation industry. If there are sufficient number of students who are interested to join pilot training programmes after graduation, special elective subjects in relation to pilot ground theory training may be offered to prepare them to enter into the pilot training institutes.

Graduates of this programme can find employment as professional engineers in maintenance, repair and operations organisations, and in the areas of air transportation, logistics, airline and airport operations, and aircraft component design and manufacture.

2.2 Programme Objectives

This programme aims at producing graduates with:

1. In-depth understanding of the operation of aviation engineering including aircraft and aviation systems, airworthiness and up-to-date technologies, as well as specialized knowledge in a chosen stream of study.

2. Competence to handle different engineering problems academically and practically in the aviation industry.

3. Sufficient knowledge to manage and solve problems through effective and efficient project management and planning.

4. Confidence in communication with different stakeholders by the use of state-of-the arts 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 nurture graduates who are critical thinkers, effective communicators, innovative problem solvers, lifelong learners and ethical leaders.

(b) To advance knowledge and the frontiers of technology to meet the changing needs of society.

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

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

The programme aims to achieve 11 learning outcomes. Each student is expected to achieve these outcomes, which are classified into two groups as specified below, before graduation.

Professional/academic knowledge and skills (PAK):

(a) The ability to identify, formulate and solve problems in aviation engineering by applying knowledge of mathematics, science and engineering;
(b) The ability to design and conduct experiments, as well as analyze and interpret data;
(c) The ability to design a system, component or process to meet desired needs;
(d) The ability to use the techniques, skills and modern engineering tools, including the computational tools necessary for engineering practice;
(e) The ability to work professionally in aviation systems; and
(f) A basic understanding of aviation and aircraft components and aircraft regulations.

Professional outlook and workplace skills (POW):

(a) Knowledge of contemporary issues and the broad education necessary to understand the impact of engineering solutions in a global and societal context;
(b) The ability to function professionally in multidisciplinary teams;
(c) An understanding of professional and ethical responsibility;
(d) The ability to communicate effectively; and
(e) Recognition of the need to 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	Desired Learning Outcomes Proposed by HKIE for Engineering Degrees	ILOs of the Current Programme
1	An ability to apply knowledge of mathematics, science and engineering appropriate to the degree discipline.	PAK: a, b, c, d POW: a
2	An ability to design and conduct experiments, as well as to analyse and interpret data.	PAK: b, c, d POW: a, b
3	An ability to design a system, components or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety. Manufacturability and sustainability.	PAK: b, c, d, f POW: a, b, c, e
4	An ability to function on multi-disciplinary team	POW: b
5	An ability to identify, formulate and solve engineering problems	PAK: a, b POW: a
6	An ability to understand professional and ethical responsibility	POW: c
7	An 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

Learning Outcomes	Desired Learning Outcomes Proposed by HKIE for Engineering Degrees	ILOs of the Current Programme
9	An ability to stay abreast of contemporary issues	PAK: d, e, f POW: a, b, e
10	An ability to recognize the need for, and to engage in life-long learning	POW: e
11	An 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	An 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. Table 3.1 lists the subjects, their credit values, pre-requisite requirements (if any) and the category to which they belong (Compulsory or Elective). All subjects shown as compulsory are non-deferrable and must be taken in accordance to the progression pattern. The subjects offered will be updated from time to time according to the needs of society and the profession.

To satisfy the graduation requirements, students are required to complete a minimum of 124 *[30 credits for General University Requirements (GUR) and 94 credits for Discipline-Specific Requirements (DSR)]* or more academic credits and 10 training credits. The exact number of academic credits required will depend on the academic background of students. The subjects contributing to the requisite number of academic credits and training credits are listed in Table 3.1.

Compulsory Subjects

Subject Code	Subject Title	Credit	Pre-requisites (if any)
General University Requirements (GUR)			
- -	Cluster-Area Requirement I (CAR I)	3	
- -	Cluster-Area Requirement II (CAR II)	3	
- -	Cluster-Area Requirement III (CAR III)	3	
- -	Cluster-Area Requirement IV (CAR IV)	3	
- -	Language and Communication Requirement I (LCR I) – English *	3	
- -	Language and Communication Requirement II (LCR II) – English *	3	
- -	Language and Communication Requirement III (LCR III) – Chinese *	3	
APSS1L01	Tomorrow's Leaders	3	
- -	Service-Learning	3	
ENG1003	Freshman Seminar for Engineering	3	
- -	Healthy Lifestyle	0	
Discipline-Specific Requirements (DSR)			
AAE2001	Introduction to Aircraft and Aviation Systems	3	
AAE2002	Aviation Information Systems	3	ENG2002 and ENG2003
AAE3001	Fundamentals of Aerodynamics	3	AMA2111
AAE3002	Aircraft Structures and Materials	3	ENG2001 and ME23001
AAE3003	Aircraft Propulsion Systems	3	AAE3001
AAE3004	Dynamical Systems and Control	3	AMA2112
AAE4002	Capstone Project	6	Refer to SDF in Part B
AAE4004	Airworthiness and Regulations	3	AAE2001 **and** ISE3009
AAE4006	Flight Mechanics and Control Systems	3	AAE3004
AAE4301	Avionics System	3	AAE2001

Subject Code	Subject Title	Credit	Pre-requisites (if any)
AF3625	Engineering Economics	3	
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics	3	
AMA1120	Basic Mathematics II – Calculus and Linear Algebra	3	AMA1110
AMA2111	Mathematics I	3	AMA1120
AMA2112	Mathematics II	3	AMA2111
AP10001	Introduction to Physics	3	
AP10005	Physics I	3	
AP10006	Physics II	3	
CLC3243P	Chinese Communication for Aviation *	2	
EE2902S	Fundamentals of Electrical and Electronic Engineering	3	
ELC3521	Professional Communication in English *	2	LCR-English
ENG2001	Fundamentals of Materials Science and Engineering /Chemistry / Biology	3	
ENG2002	Computer Programming	3	
ENG2003	Information Technology	3	
ENG3003	Engineering Management	3	
ENG3004	Society and the Engineer	3	
ISE3009	Aviation Safety and Reliability	3	
ME23001	Engineering Mechanics	3	
IC2105	Engineering Communication and Fundamentals	4 (TRN)	
IC381	Appreciation of Aircraft Manufacturing Processes	3 (TRN)	IC2105
IC388	Aircraft Manufacturing and Maintenance Practice	3 (TRN)	IC381

Electives

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Aircraft Maintenance Engineering			
AAE4101	Aviation Power Systems	3	
AAE4105	Engineering Composites	3	AAE3002
AAE4106	Aircraft Gas Turbine Systems	3	AAE2001 and AAE3003
AAE4201	Flight Control Systems	3	
AAE4302	Aircraft Electronics	3	EE2902S
AAE4305	Advanced Electronics Instrumentation and Control – Flight Management Systems	3	AAE4302
ME33001	Mechanics of Materials	3	ME23001 and ENG2001
Aerial Vehicle Autonomy			
AAE4201	Flight Control Systems	3	
AAE4202	Electronics & Information Technologies for Unmanned Aerial Systems	3	EE2902S
AAE4203	Guidance and Navigation	3	AAE3004
AAE4204	Robotics and Intelligent Machines	3	AAE3004
AAE4304	Advanced Positioning and Navigation Systems	3	AAE2001
Aviation Services Engineering			
AAE4003	Airport Services Engineering	3	
AAE4007	Aircraft Leasing and Finance (subject to approval)	3	
AAE4008	Aviation Finance, Taxation and Insurance (subject to approval)	3	
ISE3004	Systems Modeling and Simulation	3	
ISE3013	Data Management in Aviation Industries	3	
ISE4014	Aircraft Service Engineering and Logistics	3	

Subject Code	Subject Title	Credit	Pre-requisites (if any)
Pilot Ground Theory			
AAE4304	Advanced Positioning and Navigation Systems	3	AAE2001
AAE4902	Pilot Ground Theory	3	AAE2001
AAE4903	Human Factor in Aviation	3	
AAE4904	Meteorology in Aviation	3	

Table 3.1

Note:

AAE Interdisciplinary Division of Aeronautical and Aviation Engineering
AF School of Accounting and Finance
AMA Department of Applied Mathematics
AP Department of Applied Physics
CLC Chinese Language Centre
EE Department of Electrical Engineering
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
TRN Training credits

** Details of the Language and Communication Requirements (LCR) are set out in para. 5.15.3*

(1) This subject is required only for HKDSE students who do not have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics); non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities; and other students who do not possess the equivalent qualifications.

(2) Students must choose one subject from (a) to (f) listed below:

Engineering Materials:	*(a) ENG2001 Fundamentals of Materials Science and Engineering*
Biology#:	*(b) ABCT1101 Introductory Life Science*
	(c) ABCT1303 Biotechnology and Human Health
	(d) BME11101 Bionic Human and the Future of Being Human
Chemistry#:	*(e) ABCT1301 Chemistry and Modern Living*
	(f) ABCT1314 Chemistry and Sustainable Development

#Double fulfilment of DSR and CAR

Students choosing any one subject in the "Biology" and "Chemistry" areas will have the subject double-counted towards the fulfilment of both the Discipline Specific Requirement (DSR) and CAR-D (Science, Technology and Environment). They are required to choose any 3-credit subject (except for Level-0 subjects and training subjects (including clinical/field training)) to make up for the total credit requirement.

3.2 Normal Progression Pattern

Tables 3.2 (a) and (b) present two typical progression patterns. They are only indicative and by no means mandatory; students may take slightly different plans provided that the credit requirements of the intended award are fulfilled within the maximum period of registration. Each subject carries 3 credits, unless specified otherwise.

Normal Progression Pattern
(Total 124 academic credits + 10 training credits)

(a) For students who have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics), or the equivalent qualifications.

(b) For non-local students from the Chinese Mainland who have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities.

Year 1	
Semester 1 (15 credits)	**Semester 2 (18 credits)**
AMA1110 Basic Mathematics I	AMA1120 Basic Mathematics II
AP10005 Physics I	AP10006 Physics II
ENG1003 Freshman Seminar for Engineering	ENG2003 Information Technology
CAR I ^	APSS1L01 Tomorrow's Leaders
LCR I ^	CAR II ^
	LCR II ^
Healthy Lifestyle (non-credit bearing) ^	
IC2105 Engineering Communication and Fundamentals (4 training credits)	
Year 2	
Semester 1 (15 credits)	**Semester 2 (15 credits)**
AMA2111 Mathematics I	AMA2112 Mathematics II
ENG2001 Fundamentals of Materials Science and Engineering / Biology / Chemistry	EE2902S Fundamentals of Electrical and Electronic Engineering
ENG2002 Computer Programming	AAE2002 Aviation Information Systems
ME23001 Engineering Mechanics	LCR III ^
CAR III ^	AAE2001 Introduction to Aircraft and Aviation Systems
	IC381 Appreciation of Aircraft Manufacturing Processes (3 training credits)

Year 3	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
ELC3521 Professional Communication in English *(2 credits)*	AF3625 Engineering Economics
AAE3001 Fundamentals of Aerodynamics	ISE3009 Aviation Safety and Reliability
AAE3002 Aircraft Structures and Materials	AAE4301 Avionics System
AAE3004 Dynamical Systems and Control	AAE3003 Aircraft Propulsion Systems
CAR IV ^	AAE4006 Flight Mechanics and Control Systems
Service Learning ^	
IC388 Aircraft Manufacturing and Maintenance Practice (3 training credits)	
Year 4	
Semester 1 (14 credits)	**Semester 2 (15 credits)**
CLC3243P Chinese Communication for Aviation *(2 credits)*	ENG3003 Engineering Management
AAE4004 Airworthiness and Regulations	ENG3004 Society and the Engineer
Elective Subject (1)	Elective Subject (3)
Elective Subject (2)	Elective Subject (4)
AAE4002 Capstone Project (6 credits)	

Table 3.2 (a)

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

Normal Study Pattern
(Total 127 academic credits + 10 training credits)

(a) For students who do not have Level 2 or above in HKDSE Physics (or Combined Science with a component in Physics), or the equivalent qualifications.

(b) For non-local students from the Chinese Mainland who do not have a Pass (a pass is taken as 60% of the total marks of the subject) in the Physics or Integrated Science subject in the Joint Entrance Examination for Universities.

Year 1	
Semester 1 (18 credits)	**Semester 2 (18 credits)**
AMA1110 Basic Mathematics I	AMA1120 Basic Mathematics II
AP10001 Introduction to Physics	AP10005 Physics I
ENG1003 Freshman Seminar for Engineering	AP10006 Physics II
CAR I ^	ENG2003 Information Technology
CAR II ^	APSS1L01 Tomorrow's Leaders
LCR I ^	LCR II ^
Healthy Lifestyle (non-credit bearing) ^	
IC2105 Engineering Communication and Fundamentals (4 training credits)	

Year 2	
Semester 1 (15 credits)	**Semester 2 (15 credits)**
AMA2111 Mathematics I	AMA2112 Mathematics II
ENG2001 Fundamentals of Materials Science and Engineering / Biology / Chemistry	EE2902S Fundamentals of Electrical and Electronic Engineering
ENG2002 Computer Programming	AAE2002 Aviation Information Systems
ME23001 Engineering Mechanics	LCR III ^
CAR III ^	AAE2001 Introduction to Aircraft and Aviation Systems
	IC381 Appreciation of Aircraft Manufacturing Processes (3 training credits)

Year 3	
Semester 1 (17 credits)	**Semester 2 (15 credits)**
ELC3521 Professional Communication in English *(2 credits)*	AF3625 Engineering Economics
AAE3001 Fundamentals of Aerodynamics	ISE3009 Aviation Safety and Reliability
AAE3002 Aircraft Structures and Materials	AAE4301 Avionics Systems
AAE3004 Dynamical Systems and Control	AAE3003 Aircraft Propulsion Systems
CAR IV ^	AAE4006 Flight Mechanics and Control Systems
Service Learning ^	
IC388 Aircraft Manufacturing and Maintenance Practice (3 training credits)	

Year 4	
Semester 1 (14 credits)	**Semester 2 (15 credits)**
CLC3243P Chinese Communication for Aviation *(2 credits)*	ENG3003 Engineering Management
AAE4004 Airworthiness and Regulations	ENG3004 Society and the Engineer
Elective Subject (1)	Elective Subject (3)
Elective Subject (2)	Elective Subject (4)
AAE4002 Capstone Project (6 credits)	

Table 3.2 (b)

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

Elective Subjects^

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 7. ME33001 Mechanics of Materials
2. Aerial Vehicle Autonomy	1. AAE4201 Flight Control Systems 2. AAE4202 Electronics & Information Technologies for Unmanned Aerial Systems 3. AAE4203 Guidance and Navigation 4. AAE4204 Robotics and Intelligent Machines 5. AAE4304 Advanced Positioning and Navigation Systems
3. Aviation Services Engineering	1. AAE4003 Airport Services Engineering 2. ISE3004 Systems Modeling and Simulation 3. ISE3013 Data Management in Aviation Industries 4. ISE4014 Aircraft Service Engineering and Logistics 5. AAE4007 Aircraft Leasing and Finance (subject to approval) 6. AAE4008 Aviation Finance, Taxation and Insurance (subject to approval)
4. Pilot Ground Theory	1. AAE4304 Advanced Positioning and Navigation Systems 2. AAE4902 Pilot Ground Theory 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 fulfil 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 fulfil 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 acquire practical insights on how the industry works and practices in a specific aviation sector. The internship programme normally takes place for three months starting from June to August. Some students may spend this period to attend training arranged by the industry or prepare for licensed paper examination if necessary. Continued works done by the students may be possible to proceed to their final year capstone project if approval is sought from the Programme Leader.

3.6 Capstone Project

All students are required to complete a final year project 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 aviation engineering to solve real life problems related to the aviation industry.

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	Intended Learning Outcomes (ILOs) of the Programme										
	PAK						POW				
	a	b	c	d	e	f	a	b@	c#	d*	e%
DISCIPLINE-SPECIFIC REQUIREMENTS (DSR) - Compulsory Subjects											
AAE2001			TPM		TPM	TPM					
AAE2002					TPM					TP	
AAE3001	TPM			TPM							
AAE3002	TP	TPM	TPM			TPM					
AAE3003				TP			TPM		TPM		
AAE3004	TPM	TPM					TPM				
AAE4002	TPM	TPM	TP	TPM	TP	TP	TP	TPM	TP	TPM	TPM
AAE4004					TPM		TPM	TPM			
AAE4006	TPM	TPM	TPM								TPM
AAE4301		TP		TPM	TP	TPM				TPM	
AF3625				TP	TP						
AMA1110	TP										
AMA1120	TP										
AMA2111	TP										
AMA2112	TP										
AP10005	TP										
AP10006	TP										
CLC3243P					TP					TPM	
EE2902S	TP	TP									
ELC3521										TPM	
ENG2001	TP	TP									
ENG2002				TPM						TPM	
ENG2003				TP			TP				
ENG3003					TPM			TPM			TPM
ENG3004							TPM		TPM		TPM
ISE3009					TPM		TP	TPM	TPM		
ME23001	TP					TP					
IC2105			TP			TP					
IC381					TP	TPM					
IC388			TPM			TPM			TPM		

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
ME33001	TPM	TPM						TP		TP	
Aerial Vehicle Autonomy											
AAE4201					TP	TP					TP
AAE4202	TP		TP	TP		TP	TP				
AAE4203	TP			TP		TP				TP	TP
AAE4204	TP		TP	TP							TP
AAE4304	TP			TP			TP		TP		
Aviation Services Engineering Technical Stream											
AAE4003				TP	TP				TP		
AAE4007*		TP			TP			TP	TP		TP
AAE4008*					TP			TP		TP	TP
ISE3004		TP	TP	TP						TP	
ISE3013	TP					TP		TP		TP	
ISE4014	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	

** subject to approval*

4. Management and Operation

4.1 Divisional Undergraduate Programme Committee

The composition of the Divisional Undergraduate Programme Committee (DUPC) is decided by the Head of Division and approved by Faculty Board of Engineering. Normally, it consists of Programme Leaders of all degree programmes hosted by the Division, Head of Division, representative from the Divisional Learning and Teaching Committee, teaching staff representatives, representatives from major serving departments and student representatives. The DUPC is responsible for programme review and development. It will exercise the overall academic and operational responsibility for the programmes and their development within defined policies, procedures and regulations. The DUPC will meet at least twice a year, and additionally at the request of the Chairman or of one-third of its membership or of the Chairman of the Senate.

4.2 Programme Leader

The Programme Leader is appointed by the Head of Division, subject to the confirmation by the Chairman of the Faculty Board of Engineering. He/she is accountable in day-to-day operational terms to the Head of Division.

4.3 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 Programme Committee.

4.4 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. The reports of SSCG will be included in the annual programme review documents.

4.5 Academic Advisor

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 aims of academic advising for this programme are:

1. To build up an early connection between the students and the Faculty, and to promote their sense of affiliation to the Faculty and the University,
2. To provide students with information about the academic regulations and requirements regarding the Aviation Engineering 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,
6. To enhance the linkage among students and academic staff in the teaching/learning system,
7. To supervise and provide guidance to students on the fulfilment of WIE requirements.

Under this system, each student will be assigned an academic staff as his/her academic advisor. The main responsibilities of the academic advisor will include:

1. To meet with the Year 1 students at the common orientation and to explain the Academic Advising System to them.
2. To be accessible and available to students, and responding to their questions and concerns which are related to their studies.
3. To help students consider and clarify their intellectual, professional and personal goals.
4. To help students develop an appropriate study plan and assist in their selection of appropriate subjects to achieve their identified goals.
5. To clarify to students the academic regulations and requirements.
6. To build rapport with the students, serving as a bridge that connects them to the Division, GUR Office and Centre (STARS).
7. To identify students with special learning needs or early signs of learning problems, and refer/encourage them to seek help or support.
8. To advise students regarding their summer internship.
9. To supervise and provide guidance to students on the fulfilment of WIE requirements.

The assignment of Academic Advisors will be made and announced to students at the commencement of each academic year.

5. Academic Regulations

The academic regulations described below are based on the information known as of July 2017. 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 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 programme curriculum, 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-requisites).

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 policies 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 applies 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 progrramme), 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 Definite 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 fulfil this part of the GUR, since the original CAR subject may not be offered; in such cases, the fail grade for the first CAR subject will be taken into account in the calculation of the GPA, despite the passing of the second CAR subject. (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.

5.14.5 For students taking the Major/Minor study route (see para. 5.19 for details), a separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for Board of Examiners to moderate the award classification for the Major, as explained further in para. 5.16.

5.15 University Graduation Requirements

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

(i) Complete successfully the requisite number of credits, including the 'compulsory' and 'elective' requirements as defined in para. 3.1.
(ii) Earn a cumulative GPA of 2.0 or above at graduation.
(iii) Complete successfully the mandatory WIE component.
(iv) Satisfy the residential requirement for at least one-third of the credits required for the award.
(v) Satisfy the following GUR requirements:

Areas	Credits
▪ Freshman Seminar	3
▪ Language & Communication Requirements (LCR) [3]	9
o English	(6)
o Chinese	(3)
▪ Leadership and Intra-personal Development	3
▪ Service-Learning	3
▪ Cluster-Area Requirements (CAR)	12
3 credits from each of the following 4 cluster areas	
o Human Nature, Relations and Development	(3)
o Community, Organisation and Globalisation	(3)
o History, Cultures and World Views	(3)
o Science, Technology and Environment	(3)
and of which	
o A minimum of 3 credits on subjects designated as "China-related"	
▪ Healthy Lifestyle (non-credit bearing)	Nil
Total GUR credits	30

(vii) 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 fulfil 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.

[3] 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.

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. 5.15.12 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, i.e. CBS3341P Chinese Communication for Air Transportation. 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.

Freshman Seminar

5.15.9 All students must successfully complete, normally in their first year of study, one 3-credit Freshman Seminar offered by their chosen Broad Discipline. The purpose is to (1) introduce students to their chosen discipline and enthuse them about their major study, (2) cultivate students' creativity, problem-solving ability and global outlook, (3) give students an exposure to the concepts of, and an understanding of, entrepreneurship, and (4) engage students, in their first year of study, in desirable forms of university learning that emphasises self-regulation, autonomous learning and deep understanding.

A list of Freshman Seminars offered by the Broad Disciplines can be found at: https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm

Leadership and Intra-Personal Development

5.15.10 All students must successfully complete one 3-credit subject in the area of Leadership and Intra-Personal Development, which is designed to enable students to (1) understand and integrate theories, research and concepts on the qualities (particularly intra-personal and interpersonal qualities) of effective leaders in the Chinese context, (2) develop greater self-awareness and a better understanding of oneself, (3) acquire interpersonal skills essential for functioning as an effective leader, (4) develop self-reflection skills in their learning, and (5) recognise the importance of the active pursuit of knowledge on an intra-personal and interpersonal level and its relationship to leadership qualities.

A list of designated subjects for meeting the leadership and intra-personal development requirement is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm

Service-Learning

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

These subjects may take the form of:

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

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

A list of designated subjects for meeting the service-learning requirement is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/index.htm

Cluster Areas Requirement (CAR)

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

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

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

5.15.13 Of the 12 credits of CAR described in para. 5.15.12 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

Healthy Lifestyle

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

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

healthy living and plans for self-improvement or maintenance of health behaviour. Details of the programme can be found at: http://www.polyu.edu.hk/ogur/student/4yr/gur/hls/revised.

Students taking the Major/Minor option

5.15.15 Students taking the Major/Minor option (also see details in para. 5.19) will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 2.0 or above and have also submitted an application for graduation. If the 18 credits taken for the approved Minor study can meet the requirements for that Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. Otherwise, students will graduate with a Major only.

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

Students taking the Double Majors option

5.15.17 Students are required to obtain an overall GPA of at least 2.0 in order to satisfy the requirement for graduation with Double Majors (also see details in para. 5.19). They will not be allowed to graduate with one of the 2 Majors.

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.

Students taking the Major/Minor studies

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

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

5.16.6 "Minor GPA" is derived based on the 18 credits of specific Minor programme. "Minor GPA" is unweighted.

5.16.7 The "Major GPA" and the "Minor GPA" will be presented separately to the Board of Examiners for consideration. The guidelines for determining award classification as stipulated in para. 5.17 below are applicable to programmes with Major/Minor studies.

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 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.

5.18.1 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 Minor Study and Double Majors

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

Minor Study

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

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

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

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

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

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

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

(g) Students are required to obtain a GPA of at least 2.0 in order to satisfy the requirement for graduation with a Major plus a Minor.

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

(i) Students graduating with a Major plus a Minor will receive one award parchment, which will list the title of the Major programme only. The honours classification will be based on the Major GPA, and reflected accordingly on the parchment. The

award title of the Minor programme will not be reflected on the parchment. It will be recorded in the Transcript of Studies.

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

Double Majors

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

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

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

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

(d) Students will be put on academic probation if they fail to obtain a GPA of 2.0 or above.

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

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

(g) Students are required to obtain an overall GPA of at least 2.0, in order to satisfy the requirement for graduation with Double Majors. They will not be allowed to graduate with one of the 2 Majors.

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

5.20 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	ENG1003
Subject Title	Freshman Seminar for Engineering
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. Introduce students to the engineering broad discipline and enthuse them about their major study 2. Cultivate students' creativity and problem-solving ability, and global outlook 3. Introduce students to the concept of entrepreneurship 4. Engage the students in desirable forms of learning at university that emphasizes self-regulation, autonomous learning and deep understanding
Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study b. Develop their problem-solving ability and global outlook c. Be able to demonstrate an understanding of entrepreneurship d. Be able to search for information, formulate a project plan, and manage a project with initiative e. Be able to demonstrate an understanding of academic integrity.
Subject Synopsis/ Indicative Syllabus	***1. Online Tutorial on Academic Integrity (4 hours*)*** Students will be required to complete successfully an Online *Tutorial on Academic Integrity* on or before week 5 of the first semester. The students will understand the importance of academic integrity by completing the Online Tutorial. ***2. Seminars (12 hours*)*** There will be seminars given by various speakers on various topics to introduce to students the engineering broad discipline, to enthuse them about their major study, to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession, and to cultivate students' global outlook. The formats of the seminars may be, but not limited to, Departmental Seminars, and Renowned Speaker Seminar.

	3. Freshman Project (45 hours*) There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, and team-work abilities through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems. ***4. Entrepreneurship Project (45 hours*)*** The entrepreneurship project is designed to develop students' appreciation and understanding about entrepreneurship and the commercialization process by attending lectures, workshops and tutorials. In the course of the Entrepreneurship Project, students will identify technology opportunities and learn the skills of preparing a simple business plan. (* Note: hours indicate total student workload)
Teaching/Learning Methodology	***Online Tutorial on Academic Integrity*** The *Online Tutorial on Academic Integrity* is developed by the University to help the students understand the importance of academic integrity. By going through the Online Tutorial, students will be aware of the importance of upholding academic integrity during University study. They will also learn good practices by which to stay clear of dishonest behaviors and academic plagiarism. ***Seminars*** The seminars (such as renowned speaker seminars and departmental seminars) are designed to arouse students' interest about engineering. The delivery mode will be *interactive* and *engaging*. Students will be motivated to make preparation by searching for information and doing background reading. They will be encouraged to raise questions and discuss with the presenters. Assessment tasks (quizzes) will be designed to measure students' learning outcomes as well as to encourage participation and interaction. ***Freshman Project*** For the Freshman Project, students will work collaboratively with their group members to design and implement an engineering solution to a given problem under the guidance of instructors. There will be close staff-students and students-students *interaction*. Students will be given opportunities to develop creativity, problem-solving skills and team-work abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student's performance and achievement as well as to encourage active participation. ***Entrepreneurship Project*** There will be lectures, workshops, and tutorials. A general overview of the concepts required to conduct the project will be provided to students through lectures. They will then work in small groups in a workshop to appreciate the essential elements in the development of a business plan and subsequently to produce a simple business plan and to present it to fellow classmates. Assessment will focus towards students' understanding about entrepreneurship, innovation and creativity.

Assessment Methods in Alignment with Intended Learning Outcomes

Students' performance in this subject will be assessed by using a letter-grading system in accordance with the University's convention from grade F (failure) to A+. The relative weights of the different assessment components are as follows:

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
Online Tutorial on Academic Integrity	0%					✓
Seminars Quizzes	10%	✓				
Freshman Project Project demonstration, presentation, report and reflective essay writing	45%		✓		✓	
Entrepreneurship Project Business plan	45%			✓	✓	
Total	100 %					

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

Quizzes (online or paper-based) can measure the students' *understanding* about the engineering discipline. Through reflective essays, students can reflect on their appreciation and understanding about the *engineering* discipline. Through project demonstration, presentation and project reports, students can demonstrate their *creativity*, *problem-solving skills* and *team-work abilities*. They can also demonstrate their *ability to search for information*, *formulate a project plan*, and *manage a project with initiative*. Through business plan, students can demonstrate their understanding about *entrepreneurship*.

Pass Conditions

In order to pass this subject, students must obtain a Grade D or above for total marks comprising the Seminars, Freshman Project and Entrepreneurship Project as described here AND pass the Online Tutorial on Academic Integrity on or before week 5 of semester 1 as described in the previous section.

Student Study Effort Expected

Class contact:	
▪ Introduction and Seminars (such as Departmental Seminars, Renowned Speaker Seminar)	6 hours
▪ Freshman project: 3 hours per week for 5 weeks	15 hours
▪ Entrepreneurship project: 3 hours per week for 5 weeks	15 hours
Other student study effort:	

	▪ 4 hours for Online Tutorial on Academic Integrity; 6 hours for seminars quizzes preparation; 60 hours for Freshman project and Entrepreneurship project: background information search, project work preparation, meeting and discussion, presentation and demonstration, and report writing.	70 Hours
	Total student study effort	106 Hours
Reading and References List	H. Scott Fogler and Steven E. LeBlanc, *Strategies for creative problem solving*, Upper Saddle River, N.J. : Prentice Hall, 2008 N.J. Smith (ed), *Engineering project management*, Oxford, UK; Malden, MA: Blackwell, 2008 Gene Moriaty, *The engineering project: its nature, ethics, and promise,* University Park, Pa.: Pennsylvania State University Press, 2008. K. Allen, *Entrepreneurship for scientists and engineers*, Upper Saddle River, N.J. : Prentice Hall, 2010. The Hong Kong Institution of Engineers, "Engineering Our City", Youtube clip ref. no. nYMmI6vlVeQ HKIE Corporate Video, Youtube clip ref. no. lNMVl8MuNEY	

Discipline-Specific Requirements (DSR)

Compulsory Subjects

Subject Description Form

Subject Code	AAE2001
Subject Title	Introduction to Aircraft and Aviation Systems
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To develop students' knowledge of the basic components and operating principles of essential mechanical and electrical systems in transport aircraft. 2. To provide a broad understanding of major aviation systems and their operations in the aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate good understanding of the principles of key systems in civil transport aircraft (e.g., control system, fuel system, engine system, hydraulic system, electrical system, pneumatic system, environmental control system and emergency system). b. Gain the basic knowledge of aviation systems and their functions in the aviation industry including the roles. c. Understand the interrelationships among civil aviation administration, airlines and airport operations; air traffic control; maintenance scheduling and aviation associated environmental issues.
Subject Synopsis/ Indicative Syllabus	***Fundamentals and Structure of Aviation System*** - An overview of the operations among civil aviation authorities, airlines, airports and aviation organizations including: • ***Civil Aviation Administration*** - Air services agreements. Air traffic management. Flight standards. Aviation safety and accident investigation. • ***Airline Operations*** - Flight planning and operations. Training of flight crew, aircraft engineers and supporting staff. Management of engineering operations. Flight simulator training. • ***Airport Operations*** – Basic anatomy of airport. Passenger and air cargo terminal operations. Airport security Operations. ***Flight Control Systems*** - Principles of flight control. Operation and effect of primary and secondary flight control systems, including ailerons and spoilers, elevators, stabilators, variable incidence stabilizers and canards, rudder, rudder limiter, high lift devices, drag inducing devices, trim tabs, servo tabs and control surface bias. ***Powerplant*** - Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbo-prop engines; Types and basic performance of Inlet, compressors, combustion section, turbine section and exhaust. Fuel efficiency. Effect of specific thrust. Specific fuel consumption and flight speed. Engine cycle and performance.

	Propeller – Fundamentals of Blade element theory. High / low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance. Speed control and pitch change methods. ***Landing Gear*** - Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tires; Steering; Air-ground sensing ***Fuel Systems*** - Characteristics of aircraft fuel systems. Fuel system components. Aircraft mass and payload. System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; ***Hydraulic Systems*** - Flight control and utility functions. Emergency power sources. Landing-gear system. Braking and anti-skid. System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, *pneumatic*; *Emergency pressure generation;* Filters; Pressure Control; Power distribution; ***Electrical Systems*** - Characteristics of civil aircraft electrical system. Batteries Installation and Operation; DC power generation; AC power generation, Electrical loads and Voltage regulation, Emergency power generation. Power distribution; Inverters, transformers, rectifiers; Circuit protection; External / Ground power. ***Pneumatic Systems*** - Pitot-static systems. Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services. Use of engine bleed air. Bleed air control. Thrust reversers. ***Environmental Control Systems*** - The need for cabin and equipment conditioning. Pressurization systems and Environmental control system design; Control and indication including control and safety valves; Cabin pressure controllers. Air distribution systems. ***Fire and Oxygen Emergency Systems*** - Warning systems. Fire and smoke detection and warning systems; Fire extinguishing systems; Portable fire extinguisher. Emergency oxygen- System lay-out: cockpit, cabin; Sources, Indications and warnings. ***Ice and Rain Protection Systems*** - Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air pneumatic and chemical. ***Air Conditioning System*** - Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system.

Teaching/Learning Methodology

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

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

Industrial visits and special seminars delivered by invited industrial professionals are used to relate the concepts learnt on class to engineering practices. Students are expected to achieve better understanding of aircraft systems through these activities (outcomes a to c).

Teaching/Learning Methodology	Outcomes		
	a	B	c
Lecture	√	√	√
Tutorial	√	√	√
Industrial field visit and 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. Examination	60%	√	√	√
2. Assignments and Quizzes	40%	√	√	√
Total	100%			

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

Overall Assessment:

0.60 × End of Subject Examination + 0.40 × Continuous Assessment

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, closed-book tests, industrial visits and special seminars. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lecture/Seminar/Tutorial	39 Hrs.
Other student study effort:	
▪ Assignment/Min-Project/Report	22 Hrs.
▪ Self-study/Preparation	44 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, latest edition, AIAA Education Series, latest edition. 2. Alexander T. Wells and Seth B. Young, Airport Planning and Management, McGraw-Hill, latest edition. 3. Jon D. Fricker and Robert K. Whitford, Fundamentals of Transportation Engineering: A Multimodel Systems Approach, Prentice-Hall, latest edition. 4. Wittmer, Andreas, Bieger, Thomas, Müller, Roland (Eds.), Aviation Systems – Management of the Integrated Aviation Value Chain, Springer, latest edition. 5. Alan J. Stolzer, Carl D. Halford, John Joseph Goglia, Safety Management Systems in Aviation, Ashgate, latest edition. 6. Harry Kinnison, Aviation Maintenance Management, McGraw Hill, latest edition. 7. LeRoy Paine, Commercial Aviation—An Insider's Story, LifeRich, latest edition.

July 2017

Subject Description Form

<table>
<tr><td>Subject Code</td><td>AAE2002</td></tr>
<tr><td>Subject Title</td><td>Aviation Information Systems</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>2</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Pre-requisite: ENG2003 Information Technology, and
ENG2002 Computer Programming</td></tr>
<tr><td>Objectives</td><td>To provide students with essential knowledge of Aviation Information Systems.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:

1. Possess essential knowledge and skills in the area of information systems;
2. Apply their knowledge, skills and hand-on experience to maintain information systems;
3. Extend their knowledge to analyze and develop new modules and components for aviation applications.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Managing data processing and information systems
Review of database systems: database architectures and DBMS systems;
Managing data processing: SQL programming language; stored procedures; functions; triggers; cursors; exception handling, normalization;
Managing database in information systems: SQL injection and data recovery
Case studies on Aeronautical Data ARINC 424, ARINC 816

Data communications protocols for aviation
Review of TCP/IP suite; IP networks; Aeronautical Telecommunication Network (ATN) using the Internet Protocol suite (IPS)

Data Transmission
Characteristics of transmission lines; Line drivers & receivers and their impacts on Line Replaceable Units (LRU); Multiple Access; transmission error detection and corrections.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, laboratories, tests, case study project and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for aviation information systems.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<table>
<tr><th rowspan="2">Teaching/Learning Methodology</th><th colspan="3">Intended subject learning outcomes</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td></td></tr>
<tr><td>3. Laboratory</td><td>√</td><td>√</td><td></td></tr>
<tr><td>4. Case study report</td><td>√</td><td>√</td><td>√</td></tr>
</table>
</td></tr>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		1	2	3
1. Laboratory	20 %	✓	✓	
2. Test	20 %	✓	✓	
3. Case study project	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: laboratories, tests, and case study project. 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. Ramez Elmasri, Fundamentals of database systems, 7th Edition, Pearson, 2016.
2. Helfrick A, Principles of Avionics, 9th Edition, Avionics Communications, 2015.
3. Leanna Rierson, Developing safety-critical software: a practical guide for aviation software and DO-178c compliance, CRC Press, 2013.
4. Edited by Sarhan M. Musa, Aeronautical telecommunications network: advances, challenges, and modeling, CRC Press, 2016.
5. Edited by Thomas L. Seamster, Aviation information management: from documents to data, Ashgate, 2002.

Revised in August 2018

Subject Description Form

Subject Code	AAE3001
Subject Title	Fundamentals of Aerodynamics
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-Requisite: AMA2111 Mathematics I
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 c irculation 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.	

Subject Description Form

Subject Code	AAE3002
Subject Title	Aircraft Structures and Materials
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: ENG2001 Fundamentals of Materials Science and Engineering, and ME23001 Engineering Mechanics
Objectives	1. To provide students 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.

Subject Description Form

Subject Code	AAE3003
Subject Title	Aircraft Propulsion Systems
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AAE3001 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.	

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	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	AAE4004
Subject Title	Airworthiness and Regulations
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE2001 Introduction to Aircraft and Aviation Systems **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. This subject covers both the technical aspects of certification and the legal and economic implications. Different airworthiness requirements and regulations for civil aircraft under CAA, FAA, JAR and ICAO regulations are introduced. The purpose of the subject is to prepare students fundamental knowledge in aviation airworthiness and regulations to work in the aircraft manufactures, and aviation authorities in the future.
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 qualification tests for onboard systems and equipment, certificate process, procedure and implementation; and c) Understand transport safety, quality approval and concept, maintenance procedures and continuing airworthiness.
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; Certification in International Air Transport; Safety of Complex Systems 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

<table>
<tr><td></td><td>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 - Requirements of Air Operator’s Certificate; Operational Specifications; Maintenance Agreement; and Minimum Equipment List; Approval of Aircraft Maintenance Organization and Aircraft Maintenance Training Organization; Licensing of Aircraft Maintenance Personnel and In Service Reporting System.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1.Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Assignment</td><td>20%</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>3. Reports and presentation (Case Study)</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
</table>

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

Overall Assessment:
0.6 x End of Subject Examination + 0.4 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</td></tr>
</table>

	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	30 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.	

May 2019

Subject Description Form

Subject Code	AAE4006
Subject Title	Flight Mechanics and Control Systems
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AAE3004 Dynamical Systems and Control
Objectives	To provide students with a basic understanding of equations of motion, forces and moments, and flight control systems of Unmanned Aerial Vehicles (UAVs).
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate equations of motion of UAVs. b. Analyze equilibrium and stability for UAVs. c. Explain the basic modes of motion of UAVs. d. Design automatic flight control systems using linearized equations of motion.
Subject Synopsis/ Indicative Syllabus	***Flight Dynamics* –** Coordinate systems, equations of motion of a rigid body aircraft, linearized equations of motion, equilibrium. ***Aircraft Stability*** – Stability, transfer functions related to longitudinal and lateral motions. ***Flight Control System Components* –** Sensor and actuator dynamics, longitudinal and lateral stability augmentation systems. ***Flight Control Systems Design* –** Attitude control systems including pitch angle control, roll angle control and sideslip suppression systems, flight path control systems including position and velocity control systems.
Teaching/Learning Methodology	Lectures aim at providing students with an integrated knowledge required for understanding flight dynamics, static stability, dynamic stability and flight control systems. Theories and examples will be presented to cover the syllabus on general equations of motion for aircraft, 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 and then develop an automatic flight control system. 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. Homework assignment	20%	√	√	√	√
2. Laboratory	10%		√	√	√
3. Report	20%		√	√	√
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	33 Hrs.
	▪ Laboratory/Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	45 Hrs.
	▪ Homework assignment	12 Hrs.
	▪ Laboratory report	12 Hrs.
	Total student study effort	**108 Hrs.**
Reading List and References	1. Stevens, B. L. and Lewis F. L., Aircraft Control and Simulation, John Wiley & Sons, latest edition. 2. Mclean, D. Automatic Flight Control Systems, Prentice Hall International 3. Etkin, B and Reid, L.D., Dynamics of Flight, John Wiley, latest version	

July 2018

Subject Description Form

Subject Code	AAE4301
Subject Title	Avionics Systems
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	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, F AA, 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 outcome		
	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:

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

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/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Self Study	44 Hrs.
	▪ Case Study	22 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Helfrick A, Principles of Avionics, 9th Edition, Avionics Communications, 2015. 2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009. 3. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011. 4. Kayton Myron Walter R. Fried, Avionics Navigation Systems, Second Edition, John Wiley and Son, Published online 2007. 5. Pilot's Handbook of Aeronautical Knowledge, U.S. Department of Transportation, FAA, Flight Standards Service, 2008. 6. Advanced Avionics Handbook, U.S. Department of Transportation, FAA, Flight Standards Service, 2009. 7. Alexander V. Nebylov, Aerospace sensors, Momentum Press, 2013.	

December 2018

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	**Exclusion**: AF2618
Objectives	This subject aims to equip students with 1. the fundamental concepts of micro- and macroeconomics related to the engineering industry; 2. the fundamental understanding of finance and costing for engineering operations, budgetary planning and control.
Intended Learning Outcomes	Upon successful completion of this subject, students will be able to: a. understand how the relevant economic factors shape the environment within which an engineering company operates; b. evaluate the financial condition of a company based on the financial statements; c. apply the basic cost accounting techniques in the planning and control of engineering and production activities.
Subject Synopsis/ Indicative Syllabus	**Economic Environment of a Firm** **Microeconomic Factors** Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition, monopoly and oligopoly **Macroeconomic Factors** Government interventions: fiscal policy and monetary policy; International trade and globalization **Accounting and Engineering Economics** Financial statements; Financial ratio analysis; Return on investment; Composition of cost; Cost-volume-profit analysis; Accounting profit versus economic profit **Fundamentals of Budgetary Planning and Control** Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives

Teaching/Learning Methodology	The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students' understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c		
Continuous Assessment	**50%**					
1. In-class activities	15%	✓	✓	✓		
2. Written assignments	15%	✓	✓	✓		
3. Test	20%	✓	✓	✓		
Final Examination	**50%**	✓	✓	✓		
Total	100 %					

To pass this subject, students are required to obtain Grade D or above in **both** the Continuous Assessment and Examination components.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Study and self-learning	48 Hr.
	▪ Written assignments	18 Hr.
	Total student study effort	**105 Hrs.**

Reading List and References

Recommended Textbooks

Parkin and Bade, 2014, *Foundations of Microeconomics*, 6th Edition, Pearson.

Sullivan, Wicks and Koelling, 2014, *Engineering Economy,* 16th Edition, Pearson.

References

Drury, Colin, 2008, *Management and Cost Accounting,* 7th Edition, Cengage Learning.

Frank, Robert H., 2007, *The Economic Naturalist: Why Economics Explain Almost Everything?* Basic Books.

Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA1110</td></tr>
<tr><td>Subject Title</td><td>Basic Mathematics I – Calculus and Probability & Statistics</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>1</td></tr>
<tr><td>Pre-requisite</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. apply analytical reasoning to solve problems in science and engineering;
b. make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;
c. apply mathematical modeling in problem solving;
d. demonstrate abilities of logical and analytical thinking.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td><u>Elementary calculus</u>: Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus in optimization.
<u>Elementary Probability and Statistics</u>: Descriptive statistics, random variables, probability and probability distributions, binomial, Poisson and normal distributions, applications. Population and random samples. Sampling distributions related to sample mean, sample proportions, and sample variances. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean and the difference between two means.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and elementary techniques of limit, differential calculus, probability and statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Homework, quizzes and mid-term test</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
</td></tr>
</table>

	Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester. Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering. To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: *The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.*	
Student Study Effort Expected	**Class contact:**	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	**120 Hrs.**
Reading List and References	Chung, K.C. *A Short Course in Calculus and Matrices*, McGraw Hill 2013 Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013 Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012 Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012	

Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA1120</td></tr>
<tr><td>Subject Title</td><td>Basic Mathematics II –Calculus and Linear algebra</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>1</td></tr>
<tr><td>Pre-requisite</td><td>AMA1110</td></tr>
<tr><td>Objectives</td><td>This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. apply analytical reasoning to solve problems in science and engineering;
b. make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;
c. apply mathematical modeling in problem solving;
d. demonstrate abilities of logical and analytical thinking.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Elementary calculus: Mean Value Theorem with applications to linear approximation and curve sketching. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and engineering.
Linear algebra: Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer’s rule, vectors in 2-space or in 3-space, applications to geometry.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Basic concepts and elementary techniques of differential and integral calculus and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1.Homework, quizzes and mid-term test</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.
</td></tr>
</table>

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

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120)
Co-requisite/ Exclusion	**Exclusion:** Intermediate Calculus and Linear Algebra (AMA2007), Mathematics for Engineers (AMA2308), Engineering Mathematics (AMA2380), Applied Mathematics I (AMA2511), Engineering Mathematics (AMA290)
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply mathematical reasoning to analyze essential features of different problems in science and engineering; b. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; c. develop and extrapolate the mathematical concepts in synthesizing and solving new problems d. demonstrate abilities of logical and analytical thinking; e. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	1. Algebra of complex numbers Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number. 2. Linear algebra Review of matrices, determinants and systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications. 3. Ordinary differential equations ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits. 4. Differential calculus of functions of several variables Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.

<table>
<tr><td>Teaching/Learning Methodology</td><td>The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Homework, quizzes and mid-term test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="5"></td></tr>
</table>
Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.
Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.
To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hours</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hours</td></tr>
<tr><td>▪ Mid-term test and examination</td><td></td></tr>
<tr><td>Other student study effort</td><td></td></tr>
<tr><td>▪ Assignments and Self study</td><td>78 Hours</td></tr>
<tr><td>Total student study effort:</td><td>117 Hours</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>

C.K. Chan, C.W. Chan and K.F. Hung, Basic Engineering Mathematics, McGraw-Hill, 2013.
Anton, H. Elementary Linear Algebra (10th edition). John Wiley, 2010.
Kreyszig, E. (2011). Advanced Engineering Mathematics, 10th ed. Wiley.
James, G. (2008). Modern Engineering Mathematics, 4th ed. Prentice Hall.
Thomas, G. B., Weir, M. D. & Hass, J. R. (2009). Thomas' Calculus, 12th ed. Addison Wesley.

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

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Mathematics I (AMA2111)
Objectives	This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply mathematical reasoning to analyze essential features of different problems in science and engineering; b. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; c. develop and extrapolate the mathematical concepts in synthesizing and solving new problems d. demonstrate abilities of logical and analytical thinking; e. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	1. Multiple integrals Double and triple integrals, change of variables, applications to problems in geometry and mechanics. 2. Vector calculus Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics. 3. Series expansion Infinite series, Taylor's expansion, Fourier series expansion of a periodic function. 4. Partial differential equations Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	✓	✓
Total	100%					

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

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

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

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

The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected

Class contact:	
▪ Lecture	26 Hours
▪ Tutorial	13 Hours
▪ Mid-term test and examination	
Other student study effort	
▪ Assignments and Self study	78 Hours
Total student study effort:	**117 Hours**

Reading List and References

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2013.
2. Anton, H. *Elementary Linear Algebra* (10th edition). John Wiley, 2010.
3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley.
4. James, G. (2008). *Modern Engineering Mathematics*, 4th ed. Prentice Hall.
5. Thomas, G. B., Weir, M. D. & Hass, J. R. (2009). *Thomas' Calculus*, 12th ed. Addison Wesley.

Subject Description Form

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

<table>
<tr><td></td><td>electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.</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="7">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td></tr>
<tr><td>(1) Continuous assessment</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>(2) Examination</td><td>60</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="7"></td></tr>
</table>
Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>33 hrs</td></tr>
<tr><td>▪ Tutorial</td><td>6 hrs</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study</td><td>81 hrs</td></tr>
<tr><td>Total student study effort</td><td>120 hrs</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>John D. Cutnell & Kenneth W. Johnson, Introduction to Physics, 9th edition, 2013, John Wiley & Sons.

Hewitt, Conceptual Physics, 11th edition, 2010, Benjamin Cummings.</td></tr>
</table>

Subject Description Form

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

<table>
<tr><td></td><td>electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.</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="8">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td></tr>
<tr><td>(1) Continuous assessment</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>(2) Examination</td><td>60</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="8"></td></tr>
</table>
Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>33 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study</td><td>81 Hrs.</td></tr>
<tr><td>Total student study effort:</td><td>120 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>John W. Jewett and Raymond A. Serway, “Physics for Scientists and Engineers”, 2010, 8th edition, Brooks/Cole Cengage Learning.

W. Bauer and G.D. Westfall, “University Physics with Modern Physics”, 2011, McGraw-Hill.</td></tr>
</table>

Subject Description Form

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

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture	33 Hrs.
▪ Tutorial	6 Hrs.
Other student study effort:	
▪ Self-study	81 Hrs.
Total student study effort	120 Hrs.

Reading List and References

John W. Jewett and Raymond A. Serway, “Physics for Scientists and Engineers”, 2010, 8th edition, Brooks/Cole Cengage Learning.

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

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	CLC3243P (2019-20 onward) CBS3243P (2018-19 and before)
Subject Title	Chinese Communication for Aviation
Credit Value	2
Level	3
Pre-requisite / Co-requisite	
Objectives	This is a discipline-specific Chinese subject which aims at developing the students' language competence in Putonghua and written Chinese for professional communication necessary for them to communicate effectively with various parties and stakeholders in the sector of aviation.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to: a. read and write professional reports / manuals for specific purposes; b. understand and use the terminology of Aviation and Aeronautics in Chinese; c. produce discipline-related Chinese genres (e.g. notices, guidelines, Aeronautical circulars, other formal letters / emails) with appropriate text structures, interactive strategies and language expressions for different intended readers; d. communicate in Putonghua for various speech functions in professional context of Aviation such as introducing, clarifying and explaining.
Subject Synopsis/ Indicative Syllabus	1. Reports in Chinese in the Aviation area • Planning and organizing reports • Explaining the background, rationale, objectives, scope and significance of a report • Referring to the literature to substantiate reports 2. The Chinese Vocabulary and Terminology in Air Transportation • Reading of various 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. • Analyzing the Chinese lexical structure of the frequently used terms from the linguistic viewpoint. 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
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. Group Report in Chinese	30%	✓	✓				
2. Assignment on practical writing	20%	✓	✓	✓			
3. Situational oral presentation (individual)	20%		✓		✓		
4. PPT presentation on the report (group)	20%		✓		✓		
5. 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:	
	▪ Seminars	26 Hrs.
	Other student study effort:	
	▪ Outside class practice, e.g. planning, discussing, and writing assignments and report.	56 Hrs.

	▪ Researching and self-study	
	Total student study effort	82 Hrs.
Reading List and References	1. 民用航空術語編輯組（2002）《民用航空旅客運輸術語》。中國標準出版社。 2. 民用航空術語編輯組（2002）《民用航空貨物運輸術語》。中國標準出版社。 3. 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。 4. 于成鯤主編（2003）《現代應用文》。復旦大學出版社。 5. 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。 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. 鄭笑平（2005）《科技寫作》。河南人民出版社。	

Subject Description Form

Subject Code	EE2902S *(co-taught by EE and EIE)*
Subject Title	Fundamentals of Electrical and Electronic Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To introduce students the fundamental concepts of electrical circuits, circuit analysis techniques, and corresponding devices; 2. To provide students the fundamental knowledge of semiconductors and electronic devices.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the fundamental concepts in electrical circuits; b. Apply the appropriate techniques to solve problems in electrical circuits; c. Identify the operation and basic applications of semiconductors and their electronic devices.
Subject Synopsis/ Indicative Syllabus	1. **Electrical Circuits:** Circuit elements, Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Circuit elements, Ohm's Law. 2. **Resistive Network Analysis:** Node voltage method, mesh current method, Thévenin and Norton Equivalent circuit. 3. **AC Power:** Transformers, three-phase power, generation and distribution of AC power. 4. **Diode and Transistor Circuits:** Current-voltage characteristics of p-n junction diode, characteristics of bipolar junction transistors (BJT) and field effect transistors (FET), load line and its applications to diode and transistor circuits. 5. **Amplifiers:** Concept of amplifier, small-signal equivalent circuits, analysis of voltage, current, and power gains, input and output impedances of RC coupled amplifiers, basic amplifier configurations.
Teaching/Learning Methodology	The key concepts and techniques covered in this subject are discussed in lectures and tutorials. Emphasizes on fundamental understanding and practical problem-solving techniques are balanced. To strengthen understanding, students will have chances to make discussions, and do hands-on exercises both in the lectures and tutorials. Furthermore, individual assignments or tests consisting of essays and numerical

<table>
<tr><td></td><td>problems are involved to allow students recognize their level of understanding and create evidence of learning.</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></td><td></td><td></td></tr>
<tr><td>1.Examination</td><td>60</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Class test</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>

The students will be assessed with two main components: midterm tests and a final exam. The midterm tests and the final exam are conducted at different times in the semester to consolidate students' knowledge in lectures and tutorials. They are appropriate in assessing intended learning outcomes (a), (b) and (c).</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture / Tutorial</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-studying</td><td>66 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>1. Rizzoni, Giorgio, “Fundamentals of Electrical Engineering”, New York: McGraw-Hill, 2009
2. Rizzoni, Giorgio, “Principles and Applications of Electrical Engineering”, Boston: McGraw-Hill Higher Education, 2007</td></tr>
</table>

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 proposals in English • Planning and organising project proposals • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the literature to substantiate project proposals • Describing the methods of study • Describing and discussing project results, including anticipated results and results of pilot study • Presenting the budget, schedule and/or method of evaluation • Writing executive summaries/abstracts 2. Oral presentations of projects in English • Selecting content for audience-focused presentations • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in team

	presentations • Using effective verbal and non-verbal interactive strategies
Teaching/Learning Methodology	<u>Learning and teaching approach</u> The subject is designed to develop the students' English language skills, both oral and written, that students need 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 <u>Collaboration of input/support from the English Language Centre and the Engineering discipline</u> Students of this subject* will also take the subject *Professional Communication in Chinese*, and will work on the same project in both subjects. In producing professionally acceptable documents and delivering effective presentations, students will be engaged in the use of appropriate Chinese and English language and skills, as well as applying knowledge learned in their Engineering subjects. As such, the planning, design and implementation of the teaching and learning activities and assessments will involve collaboration between the teaching staff from the CLC, the ELC, and staff from the Engineering discipline. **with the exception of the BEng(Hons) in Air Transport Engineering and BEng(Hons) in Aviation Engineering*

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c			
1. Project proposal in English	60%	✓		✓			
2. Oral presentation of project proposal in English	40%		✓	✓			
Total	100 %						

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

1. The assessments will arise from the course-long engineering-related project.
   - Students 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.
   - Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.
2. There will be collaboration between the teaching staff from the English Language Centre and the discipline in assessing students' performances. It is expected that the teaching staff of the Engineering discipline will provide support in assessing students' application of discipline knowledge. They will be involved in assessing the oral presentations intended for experts rather than those for laymen.
3. Hence the assessment pattern will be as follows:

Assessment type	Intended readers/ audience	Timing	Assessors
(English) Written proposal in English – Document of around 1,500 words for the initial proposal	Mainly engineering experts	Week 8	ELC and Engineering staff
(English) Oral presentation of project in English – Team presentation of 30 minutes, in groups of 4 – Simulating a presentation of the final proposal	Mainly non-experts	Weeks 12-13	ELC

Student Study Effort Expected	**Class contact:**	
	▪ Seminars	26 Hrs.
	Other student study effort:	
	▪ Researching, planning, writing, and preparing the project	52 Hrs.
	Total student study effort	**78 Hrs.**
Reading List and References	Beer, D. F. (Ed.). (2003). *Writing and speaking in the technology professions*: *A practical guide* (2nd ed.). Hoboken, NJ: Wiley. Johnson-Sheehan, R. (2008). *Writing proposals* (2nd ed.). New York, NY: Pearson/Longman. Kuiper, S. (2007). *Contemporary business report writing* (3rd ed.). Cincinnati, OH: Thomson/South-Western. Lawrence, M. S. (1975). *Writing as a thinking process: Teacher's manual*. Ann Arbor, Mich: University of Michigan Press. Reep, D. C. (2006). *Technical writing: Principles, strategies and readings* (6th ed.). New York, NY: Pearson/Longman.	

Subject Description Form

Subject Code	ENG2001
Subject Title	Fundamentals of Materials Science and Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To realize the impact of the development of engineering materials on human civilization; 2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems. 3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in service performance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. comprehend the importance of materials in engineering and society; b. explain the properties and behaviour of materials using fundamental knowledge of materials science. c. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials; d. select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> Historical perspective; Evolution of engineering materials; Materials science and engineering; Classification of materials 2. <u>Atomic Structure and Structures of Materials</u> Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystalline and non-crystalline materials; Phase diagram and microstructure of alloys 3. <u>Electrical and Optical Properties of Materials</u> Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and photovoltaics; Light propagation in optical fibers; Liquid crystal; Photoelasticity 4. <u>Mechanical Properties of Materials</u> Concept of stress and strain; Stress-strain behaviour; Elastic and plastic properties of materials; Concepts of dislocations and strengthening mechanisms; Tensile

properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Impact energy, Fracture toughness; Design and safety factors

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

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

Teaching/Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

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

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

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

Student Study Effort Expected

Class contact:	
▪ Lectures, tutorials, practical	39Hrs.
Other student study effort:	
▪ Guided reading, assignments and reports	37Hrs.
▪ Self-study and preparation for test and	47Hrs.

	examination	
	Total student study effort	**123Hrs.**
Reading List and References	1. William D. Callister, Jr., David G. Rethwisch, *Fundamentals of materials science and engineering,* 4th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-53126-6 2. William D. Callister, Jr., David G. Rethwisch, *Materials Science and Engineering*, 8th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-37325-5 3. Materials World (Magazine of the Institute of Materials, Minerals and Mining)	

Subject Description Form

Subject Code	ENG2002
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	1. To introduce the fundamental concepts of computer programming 2. To equip students with sound skills in C/C++ programming language 3. To equip students with techniques for developing structured and object-oriented computer programs 4. To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Familiarize themselves with at least one C/C++ programming environment. 2. Be proficient in using the basic constructs of C/C++ to develop a computer program. 3. Be able to develop a structured and documented computer program. 4. Understand the fundamentals of object-oriented programming and be able to apply it in computer program development. 5. Be able to apply the computer programming techniques to solve practical engineering problems.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to programming - Components of a computer; Programming environment; Process of application development. 2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators. 3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables. 4. Program Design and Debugging - Structured program design; Debugging a program. Case study: Using the Visual C++ debugger. 5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors. 6. Pointer and Array - Stack and Free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing.

<table>
<tr><td></td><td>7. Stream I/O - Input and output as streams; File I/O using streams.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
<table>
<tr><th>Teaching and Learning Method</th><th>Intended Subject Learning Outcome</th><th>Remarks</th></tr>
<tr><td>Lectures, supplemented with short quizzes</td><td>2,3,4</td><td>Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using C/C++ and apply the techniques of developing structured object-oriented applications.</td></tr>
<tr><td>Laboratories/tutorials where problems are given to students for them to solve</td><td>1,2,3,4,5</td><td>Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finishing the exercises, and interactive Q&A will take place.</td></tr>
<tr><td>Homework, tests and final examination</td><td>1,2,3,4,5</td><td>By doing homework, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given C/C++ applications and apply knowledge in solving problems. For some design type of problems, they will have to synthesize solutions by evaluating different alternatives. To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly. To assure students' understanding of fundamental concepts, a closed-book final examination is arranged.</td></tr>
</table>
</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>1. In-class exercises</td><td>10</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Short-quizzes</td><td>15</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
</table>
</td></tr>
</table>

	3. Programming tests	30	✓	✓	✓	✓	✓
	4. Homework	15	✓	✓	✓	✓	✓
	5. Final examination	30	✓	✓	✓	✓	✓
	Total	100 %					

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

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

Student Study Effort Expected		
	Class contact:	**39 Hours**
	▪ Lectures, Tests and Quizzes	26 Hours
	▪ Laboratory/Tutorial	13 Hours
	Other student study effort:	**71 Hours**
	▪ Self-studying	57 Hours
	▪ Homework	14 Hours
	Total student study effort	**110 Hours**

Reading List and References

Reference Books:

1. S. Rao, Sams Teach Yourself C++ in One Hour a Day. Indianapolis, IN: Sams, 2012.
2. P.J. Deitel and H.M. Deitel, *C++ How To Program*, 9th ed. Boston, MA: Prentice Hall, 2014.
3. J. Liberty and R. Cadenhead, Sams Teach Yourself C++ in 24 hours (5th ed.) Indianapolis, IN: Sams, 2011.
4. I Horton, Ivor Hortons Beginning Visual C++ 2010 [electronic resource]. Indianapolis, IN: Wiley, 2010.

Subject Description Form

Subject Code	ENG2003
Subject Title	Information Technology
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To provide the foundation knowledge in internet applications, computer networks, and database management that is essential to modern information system design
Intended Learning Outcomes	Upon completion of the subject, students will be able to: Category A: Professional/academic knowledge and skills 1. Understand the functions and features of modern computers and operating systems. 2. Understand the client-server architecture and be able to set up multiple internet applications. 3. Understand the principles of computer networks and be able to set up simple computer networks. 4. Understand the basic structure of a database system and be able to set up a simple database system. Category B: Attributes for all-roundedness 1. Solve problems using systematic approaches.
Subject Synopsis/ Indicative Syllabus	1. Introduction to computers Introduction to information technology using Cloud Computing as a real life example. Introduction to modern computers (Personal Computers/Computer Clusters) and operating systems (Resource Management/Privilege Control). 2. Computer Networks Introduction to computer networks (Client-Server Architecture). Study different internet applications (HTTP/FTP/DNS). Explain basic concepts on packet routing (Data Encapsulation/IP Addressing/Functions of Routers). Introduction to basic network security measures. 3. Introduction to data processing and information systems Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Introduction to Information systems. Workflow management. Case study: Database design, implementation and management.
Teaching/Learning Methodology	There will be a mix of lectures, tutorials, and laboratory sessions/workshops to facilitate effective learning. Students will be given case studies to understand and practice the usage of modern information systems.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		A1	A2	A3	A4	B1	
1. Continuous Assessment	50%	✓	✓	✓	✓	✓	
2. Examination	50%	✓	✓	✓	✓	✓	
Total	100 %						

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

The assessment methods include an end-of-subject examination (50%) and continuous assessment (50%), including quizzes, laboratory sessions/workshops, and assignments. The examination and quizzes cover intended subject learning outcomes A1, A2, A3, A4, and B1. The laboratory sessions/workshops cover intended subject learning outcomes A2, A3, A4, and B1.

The examination is a 2-hour, closed-book examination. Quizzes in lectures and tutorial sessions can be either open-book or closed-book quizzes. The laboratory sessions/workshops give students hands-on experience on setting up internet-applications, building up computer networks, and constructing database.

Student Study Effort Expected

Class contact:	
▪ Lectures (18), tutorials (6), and workshops (15)	39 Hrs.
Other student study effort:	
▪ Workshops preparation (6/workshop)	30 Hrs.
▪ Self study (3/week)	39 Hrs.
Total student study effort	**108 Hrs.**

Reading List and References

1. B. Williams and S. Sawyer, *Using Information Technology: A Practical Introduction to Computers and Communications*, 10th ed., McGraw-Hill, 2013.
2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 6th ed., Pearson, 2012.
3. D. E. Comer, *Computer Networks and Internets: with Internet Applications*, 5th ed., Prentice-Hall, 2008.
4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed., McGraw-Hill, 2009.
5. W. Stalling, *Data and Computer Communications*, 9th ed., Prentice-Hall, 2011.
6. P. Rob and C. Coronel, *Database Systems: Design, Implementation, and Management*, 9th Edition, Thomson, 2011.
7. M. Mannino, *Database Design, Application Development, & Administration*. 5th ed., McGraw-Hill, 2011.

Subject Description Form

Subject Code	ENG3003
Subject Title	Engineering Management
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with: 1. A practical introduction to management and a comprehensive guide to the tools and techniques used in managing people and other resources. 2. Opportunities to trace the historical development and describe the functions of management, from planning, and decision making to organizing, staffing, leading, motivating, and controlling. It also includes a discussion on engineering ethics. 3. Opportunities to explore the core business strategy, technology, and innovation, and examine how these functions intertwine to play a central role in structural design, as well as supporting an organization's overall success.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. perform tasks in an organization related to organizing, planning, leading and controlling project and process activities; b. select appropriate management techniques for improving organizational structures, work procedures, and quality performance of operational tasks; c. analyze the factors that affect changes in the work environment, and be aware of the approaches in implementing change in an organization; d. be aware of the imperatives of ethical and business behaviors in engineering organizations in a fast-changing business environment.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction</u> General management concepts in organizations; Functions and types of industrial organizations; Organizational structures; Corporate objectives, strategy, and policy 2. <u>Industrial Management</u> Roles of managers: Process of management, leadership, planning, organizing, motivating, and control of social and engineering activities; Quality management: Related tools and techniques 3. <u>Project Management</u> Project scope and objectives; Network analysis; Tools that support engineering operations and task scheduling

4. Management of Change

Change leadership; Organizational change; Phases of planned change; Stress management; Factors that affect the execution of change

5. Effects of Environmental Factors

The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues

Teaching/Learning Methodology

A mixture of lectures, tutorial exercises, and case studies are used to deliver various topics in this subject. Some topics are covered by problem-based format whenever applicable in enhancing the learning objectives. Other topics are covered by directed study so as to develop students' "life-long learning" ability.

The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related 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. Coursework • Group learning activities (10%) • Presentation (individual) (30%)	40%	✓	✓	✓	✓		
2. Final examination	60%	✓	✓	✓	✓		
Total	100%						

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

The coursework of this subject involves students working in groups to study cases that reflect the realities of management situations in an engineering setting. Through such exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their written reports on these case studies. A written final examination is also designed to assess the intended learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lectures and review	27 Hrs.
▪ Tutorials and presentations	12 Hrs.
Other student study effort:	

	▪ Research and preparation	30 Hrs.
	▪ Report writing	10 Hrs.
	▪ Preparation for oral presentation and examination	37 Hrs.
	Total student study effort	**116 Hrs.**
Reading List and References	1. John R. Schermerhorn, Jr., 2013, Introduction to Management, 12th Ed., John Wiley 2. Robbins, S P, DeCenzo, D A, and Coulter, M, 2013, Fundamentals of Management Essential Concepts and Applications, 8th Ed., Pearson 3. Morse, L C and Babcock, D L, 2010, Managing Engineering and Technology: an Introduction to Management for Engineers, 5th Ed., Prentice Hall 4. White, M A and Bruton, G D, 2011, The Management of Technology and Innovation: A Strategic Approach, 2nd Ed., South-Western Cengage Learning	

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 its 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 of technology applications; 4. observe the professional conduct as well as the legal and other applicable constraints related to various engineering issues.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify and evaluate the effects of technology applications in the social, cultural, economic, legal, health, safety, environment, and dimensions of the society; b. explain the importance of local and international professional training, professional conduct, ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; c. evaluate in a team setting the implications of a specific project in the eight dimensions of project issues related to engineers, and present the findings to laymen and peers.
Subject Synopsis/ Indicative Syllabus	1. <u>Impact of Technology on Society</u> Innovation and creativity; History and trends of technology on social and cultural developments of society 2. <u>Environmental Protection and Related Issues</u> Roles of the engineer in energy conservation, ecological balance, and sustainable development

<table>
<tr><td></td><td>3. Outlook of Hong Kong's Industry

Support organizations and impacts on economic development in Greater China and the Pacific Rim

4. Industrial Health and Safety

The Labour Department and the Occupational Health and Safety Council; Legal dimensions such as 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</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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 student's in-depth analysis of the relationship.

Students form groups; throughout the course, they will work on engineering cases by completing the following learning activities:

1. Case analysis where students provide weekly summary reports on the relationships between society and the engineering issues of a project under specific dimensions;

2. The final report as a case portfolio which includes
i. Presentation slides
ii. Feedback critique
iii. Weekly summary report
iv. Reflection

3. Final presentation</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></td><td></td><td></td></tr>
<tr><td>1. Continuous assessment</td><td>60%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>• Group weekly learning activities

• Individual final presentation

• Group report, individual reflection report</td><td>(24%)

(18%)

(18%)</td><td>✓

✓

✓</td><td>✓

✓</td><td>✓

✓</td><td></td><td></td><td></td></tr>
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2. Examination	40%	✓	✓					
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. Through these exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group 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.
▪ Tutorial and presentation	12 Hrs.
Other student study efforts:	
▪ Research and preparation	63 Hrs.
▪ Report writing	14 Hrs.
Total student study effort	**116 Hrs.**

Reading List and References

Reference Books & Articles:

1. Education for Sustainable Development - An Expert Review of Processes and Learning, UNESCO, 2011
2. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010
3. Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, 2005
4. Securing the future: delivering UK sustainable development strategy, 2005
5. 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
6. Hjorth, L, Eichler, B, and Khan, A, 2003, *Technology and Society A Bridge to the 21st Century*, Upper Saddle River, N.J.:Prentice Hall
7. The Council for Sustainable Development in Hong Kong, http://www.susdev.gov.hk/html/en/council/
8. Poverty alleviation: the role of the engineer, http://www.arup.com/_assets/_download/download67.pdf

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

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	ME23001
Subject Title	Engineering Mechanics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students the fundamental concepts of mechanics of motion and system equilibrium.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply the fundamental knowledge of mechanics to solve for forces and moments on simple systems. b. Distinguish the basic differences between diverse engineering systems, and select the suitable design in achieving the engineering purposes. c. Employ state-of-art technology in solving mechanics problems encounter in assignments and projects. d. Collaborate with peers from different disciplines in experiments and projects and present effectively the results of experiment or project.
Subject Synopsis/ Indicative Syllabus	***Fundamentals of Mechanics*** **-** Basic concepts of mechanics. Scalar and Vectors: Vector algebra and vector components. Position, unit and force vectors. Two and three-dimensional force systems. Moment of a force about a point. Moment of a force about a line. ***Dynamics*** **-** Kinematics and kinetics of particles, rectilinear motion, plane curvilinear motion, relative motion, equation of motion. ***Statics*** **-** Equilibrium of a particle and the associated free-body diagrams. Equilibrium of a rigid body and the associated free body diagram. Two and three force members equilibrium in three dimensions. Simple trusses: The method of joints; the method of sections; zero-force members; the method of sections. Internal forces developed in structural members. Shear and moment equations and diagrams. Relations between distributed load, shear and moment. Theory of dry friction. Systems with friction. Wedges. Belt friction. Rolling resistance. ***Equivalent Systems*** **-** Determination of the resultant concurrent forces. Equivalent force/couple systems. Centre of gravity and centroid: by composite parts; by integration. Resultant of a general distributed force system. Moment of inertia of areas. Parallel-axis theorem for an area. Radius of gyration of an area. Calculation of moments of areas: by composite areas; by integration. Product of inertia for an area. Principles of virtual work.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to the topics as described in the section subject synopsis (Outcomes a, b and c).

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

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 c and d).

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. Assignment	20%	✓	✓	✓	✓
2. Test	20%	✓	✓	✓	
3. Examination	60%	✓	✓	✓	
Total	100%				

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

Overall Assessment:

0.60 × End of Subject Examination + 0.40 × Continuous Assessment

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:	
▪ Course work	23 Hrs.
▪ Self-study	43 Hrs.
Total student study effort	**105 Hrs.**

Reading List and References

1. R.C. Hibbeler, Engineering Mechanics – Statics, Prentice Hall, latest edition.
2. A. Pytel, J. Kiusalaas, Engineering Mechanics – Statics, Stamford, CT : Cengage Learning, latest edition.

Industrial Centre (IC Training)

Subject Description Form

Subject Code	IC2105
Subject Title	Engineering Communication and Fundamentals
Credit Value	4 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers a wide spectrum of fundamental engineering practice that are essential for a professional engineer. This subject includes Engineering Drawing and CAD, Industrial Safety and Electronic Product Safety Test and Practice, Basic Mechatronic Practice and Basic Scientific Computing with MATLAB that aims at providing fundamental and necessary technical skills to all year 1 students interested in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems and electrical engineering; b. Interpret basic occupational health and industrial safety requirements for engineering practice; c. Explain common electronic product safety tests; d. Design and implement simple mechatronic systems with programble controller, software, actuation devices, sensing devices and mechanism; and e. Apply scientific computing software for computing in science and engineering including visualization and programming;

Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. <u>(TM8059) Engineering Drawing and CAD</u> 1.1. Fundamentals of Engineering Drawing and CAD Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing. Introduction to CAD; features of 2D CAD system (layer; draw; modify; block & attributes; standard library); techniques for the creation of titleblock; setup of 2D plotting; general concepts on 3D computer modeling; parametric feature based solid modeling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list. 1.2. Electrical Drawing Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical and electronic device symbols and layout, architectural wiring diagram with reference to the architectural symbols for electrical drawings in Hong Kong and international standards. 2. <u>(TM2009) Industrial Safety</u> 2.1. Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures. 2.2. Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 2.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling. 2.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment. 3. <u>(TM1116) Electronic Product Safety Test and Practice</u> 3.1 Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signal sources;

	3.2 Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test. 4. <u>(TM0510) Basic Mechatronic Practice</u> 4.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces. 4.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design. 5. <u>(TM3014) Basic Scientific Computing with MATLAB</u> 5.1. Overview to scientific computering; introduction to MATLAB; interactive calculations, random number generators, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting, file I/O functions. Basic 2D and 3D plots. 5.2. M-file programming & debugging; scripts, functions, logic operations, flow control, introduction to graphical user interface.
Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students' in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
		a	b	c	d	e
Continuous Assessment						
1. Assignment / Project	Refer to individual Module Description Form	✓	✓	✓	✓	✓
2. Test			✓		✓	✓
3. Report / Logbook				✓	✓	
Total	100					

Assessment Methods	Remarks
1. Assignment / Project	The project is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.
2. Test	Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.
3. Report / Logbook	Report / Logbook is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

Student Study Effort Expected

Class Contact	**TM8059**	**TM2009**	**TM1116**	**TM0510**	**TM3014**
▪ Mini-lecture	11 Hrs.	7 Hrs.	2 Hrs.	6 Hrs.	6 Hrs.
▪ In-class Assignment/ Hands-on Practice	40 Hrs.	8 Hrs.	4 Hrs.	21 Hrs.	15 Hrs.
Other Study Effort					
▪ Nil					
Total Study Effort					**120 Hrs.**

Reading List and References	**Reference Software List:** 1. AutoCAD from Autodesk Inc. 2. SolidWorks from Dassault Systèmes Solidworks Corp. 3. MATLAB from The Mathworks Inc. **Reference Standards and Handbooks:** 1. BS8888 Technical Product Specification (TPS) Specification. 2. Cecil H. Jensen, et al, Engineering Drawing and Design, McGraw-Hill, 2008. 3. Warrendale, SAE fastener standards manual, Society of Automotive Engineers, 1997. 4. Timothy H Wentzell, et al, Machine Design, Delmar Learning, 2004. 5. Czernik, Daniel, Gaskets: Design, Selection, and Testing, McGraw-Hill, 1995. 6. Michael M. Khonsari, E. Richard Booser, Applied Tribology: Bearing Design and Lubrication, Wiley-Interscience, 2001. 7. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams. 8. IEC 61082 Preparation of Documents used in Electrotechnology. **Reference Books:** Training material, manual and articles published by Industrial Centre.

Subject Description Form

Subject Code	IC381
Subject Title	Appreciation of Aircraft Manufacturing Processes
Credit Value	3 Training Credits
Level	3
Pre-requisite	IC2105
Objectives	This subject aims at developing students' understanding on the principles and operations of common aircraft manufacturing process. This subject also equips students with basic workshop skills necessary for handling manufacturing project subjects.
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. 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 detection 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; • Practical appreciation of damage detection and bonded repair techniques. <u>Additive manufacturing</u> • Working principles of major additive manufacturing technologies; • Application of additive manufacturing in aircraft design, manufacturing and repair;

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

- Practical appreciation of additive manufacturing equipment such as 3DP, FDM, SLS, SLA.

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

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.

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="3">Intended Learning Outcomes Assessed</th></tr>
<tr><th>a</th><th>b</th><th>c</th></tr>
<tr><td>1. Workshop assignments</td><td>40</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Quizzes</td><td>20</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>3. Training report</td><td>40</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>4. Total</td><td>100</td><td colspan="3"></td></tr>
</table>

Workshop assignments in the form of small 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 critical thinking and work attitude 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, as well as their material and process selection judgement.

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 learning experience. The students also elaborate on their professional attitude and commitment in their writing.

</td></tr>
<tr><td>Student Study Effort Expected</td><td>

<table>
<tr><td>Class Contact</td><td></td></tr>
<tr><td>▪ Hands-on practices</td><td>90 Hrs.</td></tr>
<tr><td>Other Study Effort</td><td>0 Hrs.</td></tr>
<tr><td>Total Study Effort</td><td>90 Hrs.</td></tr>
</table>

</td></tr>
<tr><td>Reading List and References</td><td>

Reading Materials published by Industrial Centre on:

1. Basic Fitting and Machining
2. Advanced Machining and Quality Control
3. Surface Finishing
4. Sheet Metal Fabrication Practice
5. Fiber Composites Fabrication
6. Additive Manufacturing

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</table>

Subject Description Form

Subject Code	IC388
Subject Title	Aircraft Manufacturing and Maintenance Practice
Credit Value	3 Training Credits
Level	3
Pre-requisite	IC380 or IC381
Objectives	The subject provides opportunity for students to learn the principles, gain practical and hands-on training experiences in the following fundamental aircraft engineering and maintenance procedures and practices: • Electrical Wiring Interconnection, • Welding, Brazing, Soldering and Bonding, • Disassembly, Inspection, Repair and Assembly Techniques • Transmissions • Aircraft Weight and Balance This subject also equips students with basic workshop skills necessary for handling manufacturing project subjects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Demonstrate a practical understanding on the working principle, capability, limitations and operation of fundamental aircraft manufacturing and maintenance processes; b) Select and use appropriate materials and manufacturing processes for specific parts requirements as applied to aviation engineering; c) Show a commitment to quality, timeliness, regulation conformance, and continuous improvement as applied to aviation engineering.
Subject Synopsis/ Indicative Syllabus	**1. Electrical Wiring Interconnection System (EWIS) / Cables and Connectors** Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding; Identification of wire types, their inspection criteria and damage tolerance; EWIS installations, inspection, repair, maintenance and cleanliness standards. 2. **Welding, Brazing, Soldering and Bonding** Soldering methods; inspection of soldered joints. Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints. **3. Disassembly, Inspection, Repair and Assembly Techniques** Types of defects and visual inspection techniques; Corrosion removal,

assessment and re-protection. General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes. Non-destructive inspection techniques including: penetrant, radiographic, eddy current, ultrasonic and boroscope methods. Disassembly and re-assembly techniques. Trouble shooting techniques.

4. **Transmissions**

   Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.

5. **Aircraft Weight and Balance**

   Centre of Gravity / Balance limits calculation: use of relevant documents, Preparation of aircraft for weighing; Aircraft weighing.

Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed		
		a	b	c
1. Workshop assignments	40	X	X	X
2. Quizzes	20	X	X	X
3. Training report	40	X	X	X
4. Total	100			

Workshop assignments in the form of small 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 critical thinking and work attitude 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, as well as their material and process selection judgement.

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 learning experience. The students also

	elaborate on their professional attitude and commitment in their writing.	
Student Study Effort Required	**Class Contact**	
	▪ Hands-on practices	78 Hrs.
	▪ Classroom teaching and tutorials	12 Hrs.
	Other Study Effort	**0 Hrs.**
	Total Study Effort	**90 Hrs.**
Reading List and References	1. EASA Part 66/147 compliant Module 7; Maintenance Practices for the A through B1 and B2 aircraft maintenance certification, Aircraft technical Book Company, 2016.	

Discipline-Specific Requirements (DSR)

Electives

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 to approval)*

Subject Code	AAE4007
Subject Title	Aircraft Leasing and Finance
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	N/A
Objectives	To provide students with an overview of the Aircraft Leasing Industry at undergraduate advanced level.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. describe the salient features of the Aircraft Leasing and Aviation Finance industry; 2. identify the roles and functions of various airlines and the characteristics of the airline business; 3. understand and appreciate the aircraft leasing business, economics and the management of risks related to aircraft leasing; and 4. make recommendations on a leasing transaction.
Subject Synopsis/ Indicative Syllabus	**(1) Airline fleets, growth and demand** • Aircraft fleet delivery history • Aircraft order forecasts • Aircraft types and markets segmented • Lessor market share **(2) Airline markets and segments** • Airline categories • Airline business by market (geography) • Airline market trends • Airline costs • Airline revenues **(3) Aircraft lessors** • Aircraft leasing, background and history • Aircraft lessors by size, shape, portfolio, shareholder • Aircraft leasing – key performance factors • Aircraft leasing – habitual base jurisdictions **(4) Aircraft Leasing Economics** • Individual aircraft lease financial modelling • Aspects of portfolio aircraft lease financial modelling • Accounting and Auditing mark to market valuation **(5) Aircraft Leasing Risk Management** • Aircraft general rating • Aircraft specifications and value • Airline risk, not just credit • Aircraft lease transaction risk • Aircraft lease portfolio risk • Aircraft lessor enterprise risk

(6) Aircraft Lease Risk Investment Submission / Committee

- Assist to prepare an aircraft lease transaction investment submission for discussion, review and approval decision
- Assist to conduct the corresponding aircraft lease transaction investment review committee, findings and recommendations

Teaching/Learning Methodology

(Note 3)

1. The teaching and learning methods include lectures/tutorial sessions and assignments.
2. The continuous assessments are aimed at providing students with integrated knowledge of the course of study.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	**Intended subject learning outcomes**			
	1	**2**	**3**	**4**
1. Lecture	√	√	√	√
2. Tutorial	√	√	√	√
3. Assignments	√	√		
4. Written Exam	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		1	2	3	4
1. Assignments	40%	√	√		
2. Written Exam	60%	√	√	√	√
Total	100 %				

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

Overall Assessment:

0.40 Continuous Assessment + 0.60 Written Exam

The continuous assessment consists of two 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. The written exam 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	66 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Vasigh, B., Fleming, K., & Humphreys, B. (2014). *Foundations of airline finance: Methodology and practice.* Routledge. 2. Murphy, R., & Desai, N. (Eds.). (2011). *Aircraft financing*. Euromoney Books. 3. Morrell, P. S. (2013). *Airline finance*. Ashgate Publishing, Ltd.	

August 2019

Subject Description Form *(Subject to approval)*

Subject Code	AAE4008
Subject Title	Aviation Finance, Taxation and Insurance
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	N/A
Objectives	To provide students with an advanced knowledge of aviation finance, taxation and insurance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. identify the fundamental features of the aircraft asset classes; 2. appreciate the aircraft trading models and aircraft leasing approaches; 3. recognise the fundamental features of aviation taxation and insurance considerations; and 4. understand risk management in aviation industry;
Subject Synopsis/ Indicative Syllabus	**(1) Aviation asset class and selection criteria** • Aircraft asset - Airlines: widebody and narrowbody aircraft - Chartering services: corporate jets and narrowbody aircraft - General aviation: turboprop aircraft and helicopter • Other investment opportunities - Airlines - Airport strategic development - Airport and aircraft equipment **(2) Aircraft trading** • Aircraft demand • Fleet development (Global and Regional) • Aircraft asset valuation • Market insights **(3) Aircraft leasing** • Aircraft asset portfolio management • Channel to acquire aircraft assets by aircraft leasing companies - Orderbook - Sale and Leaseback agreement with airlines - Portfolio purchase • Hedging on foreign exchange, interest rate and fuel (airlines) **(4) Secondary market of an aircraft** • Aircraft asset residual risk management • Demand on aircraft remarketing, modification, dismantling and recycling • Market insights **(5) Aircraft financing mechanism**

	• Aircraft financing in China (Free Trade Zones) versus overseas (Cayman and Ireland) • Statistics on aircraft financing and capital market • SPV financing • Engine financing • Capital structure of airlines and aircraft leasing companies **(6) Aviation taxation basics and introduction to insurance requirements** • Taxation - Airline tax treatment - Aviation financiers taxation - Taxation for aircraft manufacturers and other ancillary industries • Insurance - Liability exposure - Third party legal liability - Insurance considerations for aviation financiers - General principles in aviation insurance and common clauses - Aviation war risk insurance - Insurance considerations for financiers - Regulatory requirements for insurance **(7) Aircraft tax considerations on financing options** • Purchase versus lease • Tax considerations for airlines on the use of loan financing • Finance lease versus operating lease • Japanese Operating Lease with Call Option financing ("JOLCO Financing") • Other forms of aircraft finance **(8) Financier Taxation** • Aircraft operating lease focus - Structuring the deal - Transfer tax considerations • Taxation considerations for other financing options - Finance lease considerations - Hire purchase considerations - Loan financing • Engine / aircraft part specific consideration • Capital market transactions
Teaching/Learning Methodology	1. The teaching and learning methods include lectures/tutorial sessions and assignments. 2. The continuous assessments are aimed at providing students with integrated knowledge of the course of study. 3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	**Intended subject learning outcomes**			
	1	**2**	**3**	**4**
1. Lecture	√	√	√	√
2. Tutorial	√	√	√	√
3. Assignments	√	√		
4. Written Exam	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		1	2	3	4
1. Assignments	40%	√	√	√	
2. Written Exam	60%	√	√	√	√
Total	100 %				

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

Overall Assessment:

0.40 Continuous Assessment + 0.60 Written Exam

The continuous assessment consists of two 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. The written exam 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	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Gillen, D., & Morrison, W. G. (2015). Aviation security: costing, pricing, finance and performance. *Journal of Air Transport Management*, *48*, 1-12.
2. Keaveny, C., & Murray, S. (2013). Aviation finance and leasing. *Offshore Investment*, 239, 12-14.
3. Mann, E. D. (2009). Aviation finance: An overview. *Journal of Structured Finance*, 15(1), 109.
4. Coulter, J. M., Redpath, I. J., & Vogel, T. J. (2018). Leasing Agreements in the Airline Industry: A Case Study Examining the Impact of Asu 2016-02. Journal of Business and Educational Leadership, 7(1), 114-123.
5. Anyafo, A. (2018). Buy or Lease Decision in Fixed Assets Acquisition in the Nigerian Civil Aviation Industry. Journal of Administration, 1(1).
6. Wensveen, J. (2018). Air transportation: A management perspective. Routledge.

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

Laboratory Experiments
Typical experiments:

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

Teaching/Learning Methodology

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

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

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

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓
Experiment	✓	✓		

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		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:

$0.6 \times$ End of Subject Examination + $0.4 \times$ 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.	

May 2019

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	AAE4201
Subject Title	Flight Control Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with in depth knowledge of the use of power electronics and actuation systems in aircraft fight control system, and to provide latest development and applications in power conversion, electric actuator, fly-by-wire, fly-by-light will be covered.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. acquire good understanding of motor and motion control for flight control b. acquire good understanding of flight control system in aircraft. c. acquire good understanding of use of actuation for flight control system. d. acquire the knowledge of applying power electronics in flight control actuators.
Subject Synopsis/ Indicative Syllabus	1. **Basic electromagnetic and Motor:** Basic concept of electromagnetics, motor concept, linear and rotational motors, motor drives. 2. **Actuation technology:** Motor control, motion control, hydraulic servo pumps, electrohydraulic servo, actuator, review of conventional fight control 3. **Primary fight control:** Control yoke, ailerons, elevators, rudder, roll, pitch, and yaw controls. 4. **Secondary fight control:** Wing flaps, slats, spoilers, air brakes and variable-sweep wings 5. **Fly-by-wire control:** Reliability, fly-by-wire, fly-by-light, unmanned air vehicles
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	d
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	d		
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 t he 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. Brian L. Stevens, Frank L. Lewis,, Eric N. Johnson , Aircraft Control and Simulation: Dynamics, Controls Design, and Autonomous Systems, Wiley-Blackwell Nov 2015.. 2. Clarence W. de Silva , Sensors and Actuators: Engineering System Instrumentation, CRC Press, July 2015. 3. Austin Hughes and Bill Drury, Electric Motors and Drives: Fundamentals, Types and Applications, Newnes, May 2013	

Subject Description Form

Subject Code	AAE4202
Subject Title	Electronics & Information Technologies for Unmanned Aerial Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2902S Fundamentals of Electrical and Electronics Engineering
Objectives	To provide students with knowledge of electronics and information technologies for unmanned aerial systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. possess all required concepts and skills related to the remote control of unmanned aerial systems; 2. apply the learnt concepts and skills to maintain and perform diagnosis on existing unmanned aerial systems; 3. extend their knowledge to analyze and develop new modules and components in unmanned aerial systems for desired needs.
Subject Synopsis/ Indicative Syllabus	**Dynamics of Aerial Systems** Classifications; Modelling and control; Static flight control; Trajectory-following control **Electronics Hardware and Radio Frequency Links** Phase-locked-loop frequency synthesizers; Modulation schemes employed in remote control; MEMS and modern gyros; Practical antennae and transmission lines; User interfaces electronics for Ground Control Station GCS; Brushless motors and the associated Electronic Speed Controllers ESC; Servo motors and associated interfacing; Issues of electromagnetic interference; Power converters and charging circuits. **Embedded Controllers** Programming and hardware interfacing; Concept of Real Time Operating Systems RTOS; Implementation of control algorithms.
Teaching/Learning Methodology	1. The teaching and learning methods include lectures/hands on sessions, homework assignments, test, mini project and examination. 2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for unmanned aerial systems.

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

Teaching/Learning Methodology	Intended subject learning outcomes		
	1	2	3
1. Lecture	✓	✓	
2. Hands on	✓	✓	
3. Homework assignment	✓	✓	
4. Mini project	✓	✓	✓

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	15 %	✓	✓	
2. Test	15 %	✓	✓	
3. Mini Project	30 %	✓	✓	✓
4. Examination	40 %	✓	✓	✓
Total	100 %			

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

Overall Assessment:

0.40 End of Subject Examination + 0.60 Continuous Assessment

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.
▪ Hands on	13 Hrs.
Other student study effort:	
▪ Self-Study	22 Hrs.

	▪ Mini project	44 Hrs.
	Total student study effort	**105 Hrs.**
Reading List and References	1. D P Kotharim et al, Embedded systems, 2nd Edition, New Academic Science Limited, 2015. 2. Alan Trevennor, Experimenting with AVR microcontrollers, Apress, 2014. 3. Dan Harres, MSP430-based robot applications: a guide to developing embedded systems, Newnes, 2013. 4. Kenzo Nonami et al, Autonomous flying robots: unmanned aerial vehicles and micro aerial vehicles, Springer, 2010. 5. Donald Norris, Build your own quadcopte: power up your designs with the Parallax Elev-8, McGraw-Hill Education, 2014. 6. Reg Austin, Unmanned aircraft systems: UAVs design, development and deployment, Wiley, 2010.	

Subject Description Form

Subject Code	AAE4203
Subject Title	Guidance and Navigation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE3004 Dynamical Systems and Control
Objectives	1. To provide a fundamental understanding and knowledge of conventional and modern design and working principles of radar, guidance and navigation for air vehicles. 2. To provide the basic mathematical concepts of radar, navigation by NDB, VOR, GPS and Inertial Navigation approaches, and guidance laws. 3. To provide an expansive view into the technological trends of future aircraft navigation and guidance systems designs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand and explain the working principles of radar, navigation, guidance laws and control for air vehicles. b. Competently apply the fundamental mathematical concepts of Radar and Aircraft Navigation. c. Critically evaluate the characteristics, purposes, and design procedures of radar, aircraft navigation and guidance systems. d. Identify the technological and design trends of future aircraft navigation.
Subject Synopsis/ Indicative Syllabus	***Introduction to Radars*** **-** Radar principles and Radar equations. Block Diagram and Operation; Radar Performance, Radar Frequencies. Application of Radars; Range performance of radars. Minimum detectable signal; Noise effects. Description of operation of MIT and Pulse Doppler radars. ***Aircraft Navigation*** **-** Basic Aircraft Navigation Mathematics. Various kinds of Navigation approaches including, Dead Reckoning and pilotage, Position fixing. NDB navigation, VOR navigation. GNSS Satellite Navigation Theory and Application including Positioning and Ranging, Satellite Characteristics, GPS Structure and GPS Error. Inertial navigation systems. ***Navigation and Guidance Devices, Sensors and Systems*** **-** Principle of Gyroscope and Accelerometers, and their error sources. Flight Instruments, and Modern Aircraft Flight Management Systems. ***Guidance and Control*** **-** Classical Guidance Laws including LOS, PN Guidance laws. Modern Guidance Law. Fundamental of Guidance and Control Systems, Principles of LNAV and VNAV, Autopilot and Auto-Land Systems.

Case Studies **-** Design and Discussion of Navigation, Guidance and Control Systems for various Aerospace Vehicles. T echnological Trends in Future Aircraft Navigation, Guidance and Control Systems.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental concepts, theory, mathematical background and technical knowledge related to Radar, Aircraft Guidance and Navigation (outcomes a, b, c and d).

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

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

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial		✓	✓	
Mini Group Project			✓	✓
Homework assignments	✓	✓		

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework Assignments	15%	✓	✓		
2. Test	15%	✓	✓		
3 Mini Group Project	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.

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:	
	▪ Continue Assessment	35 Hrs.
	▪ Self-study	36 Hrs.
	Total student study effort	**110 Hrs.**
Reading List and References	1. David Wyatt, Aircraft Flight Instruments and Guidance Systems: Principles, Operations and Maintenance, Routledge, latest edition. 2. Lawrence, Modern Inertial Technology – Navigation, Guidance, and Control latest edition, Mechanical Engineering Series, Springer, latest edition. 3. Modern Navigation, Guidance and Control Processing Volume-II, Ching-Fang Lin, Prentice Hall Series in Advanced Navigation, Guidance and Control and Their Applications.	

Subject Description Form

Subject Code	AAE4204
Subject Title	Robotics and Intelligent Machines
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AAE3004 Dynamical Systems and Control
Objectives	To provide students with the knowledge in the design, modeling and analysis of different robotic systems, including flying robots and other aerospace systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the fundamentals of a robot system, including the operations of rotation, translation and other transformations. b. Analyze and solve the kinematic and dynamic models of different robots. c. Examine different computer vision and machine intelligence techniques, and their applications in robotics and intelligent machines. d. Apply the knowledge to analyze unmanned aerial vehicles (UAV) and other obotic systems and present effectively in assignments and the project.
Subject Synopsis/ Indicative Syllabus	***Robot Manipulators*** **-** coordinate transformation, Euler angles, forward and inverse kinematics, Jacobain and singularity, analysis of robot dynamics, Lagrange equation, trajectory planning. ***Computer Vision*** **-** Image formation, histogram, image filtering and segmentation, edge and line detections, feature extraction and recognition. ***Machine Intelligence*** **-** Decision making using different techniques such as Bayesian method, fuzzy logic, and neural network. ***Aerial Robot*** **-** Dynamic model construction and position estimation.
Teaching/Learning Methodology	Lectures aim at providing students with an integrated knowledge required for understanding and analyzing different robots, including system modeling, image processing and decision making (Outcomes a to d) Tutorials aim at enhancing students' analytical and problem solving skills on robotics and intelligent machines. Students will be able to solve real-world problems using the knowledge they acquired in the class. (Outcomes a to d)

The project aims to have hand-on experience to the analysis of a robot system. (Outcomes a to d)

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lecture	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓
Project	✓	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

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

Assignments, project, and tests are adopted in continuous assessment on students' timely feedback to and on-going understanding of the course. 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	33 Hrs.
▪ Tutorial	6 Hrs.
Other student study effort:	
▪ Reading and review	33 Hrs.
▪ Coursework (assignments, project)	40 Hrs.
Total student study effort	**112 Hrs.**

Reading List and References	1. S. B. Niku, Introduction to robotics : analysis, control, applications, Wiley, latest edition. 2. M. W. Spong S. Hutchinson, and M. Vidyasagar, Robot Modeling and Control, Wiley, latest edition. 3. C. Bishop, Pattern Recognition and Machine Learning, Springer, latest edition. 4. R. Lozano, Unmanned Aerial Vehicles: Embedded Control, Wiley, latest edition.

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	AAE4304
Subject Title	Advanced Positioning and Navigation Systems
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	To provide students with advanced knowledge of positioning and navigation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. possess all required mathematical concepts and skills related to the area of positioning and navigation; 2. apply the learnt concepts and skills to maintain and perform diagnosis on existing positioning and navigation systems; 3. extend their knowledge to analyze and develop new electronic modules and components in positioning and navigation for desired needs.
Subject Synopsis/ Indicative Syllabus	**Introduction and Radio Theory**: EM radiation (radio waves); dipole aerial; polarization; radio frequency spectrum; frequency, amplitude, pulse and phase modulation; SSB in HF communications; pulse modulation; classification of emissions; refraction, reflection, diffraction and attenuation; dipole, parabolic, phase array and slotted antennae; VHF; VHF/UHF; signal propagation; atmospheric/ionospheric ducting; Doppler effect; **NDB and ADF**: ground DF; VDF let-down procedure; NDB frequencies; NDBs locators and beacons; ground installations; BFO; NON A1A and NON A2A; ADF; cardioid polar diagram; RBI/RMI; errors of NDB/ADF; ICAO required fixing accuracy of NDBs; QDM and QDR interception **VOR and VOR Tracking**: VOR frequencies; principle of operation; aircraft navigation reception equipment; aircraft installation; VOR indicator/OBI; ICAO required accuracy of VOR; error of VOR; self-monitoring function; radial cross cuts; **Landing Aids**: DME, interrogation response, required accuracy, transmission classification P0N, beacon saturation. ILS Localiser, Glide-path, ILS displays on the OBI, HSI and EFIS PFD, limits of ILS CATI, II and III, MLS, principle of operation, ICAO required accuracy **Radar**: Radar theory, operating frequencies, pulse radar, radar mile, factors controlling bearing and range resolution, ground based radars, Airborne

Weather Radar (AWR), CWR (radio altimeter), Mention Doppler Radar (MTR)

Transponders: SSR transponders, operation principle, digital data in pulse transmission, Mode A and C, ADS-B

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

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

Teaching/Learning Methodology

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

Teaching/Learning Methodology	**Intended subject learning outcomes**		
	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 (Please tick as appropriate)		
		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. *Oxford ATPL Manual 11 - Radio Navigation – EASA*, Oxford Publishing, Latest Edition 2. Davide Dardari et al, *Satellite and terrestrial radio positioning techniques: a signal processing perspective,* Oxford Academic Press, 2012. 3. Pratap Misra, *Global positioning system : signals, measurements, and performance,* Ganga-Jamuna Press, 2006 4. Pat Langley-Price et al, *Ocean yachtmaster : Adlard Coles' coursebook for ocean navigation student,* Adlard Coles Nautical, 2007. 5. Mohinder S. Grewal, *Global navigation satellite systems, inertial navigation, and integration*, John Wiley & Sons, 2013 6. Aboelmagd Noureldin, *Fundamentals of inertial navigation, satellite-based positioning and their integration,* Springer, 2013	

January 2018

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

<table>
<tr><td></td><td>Management, Ergonomics of the Flight Deck, the Decision-Making Process and Situational Awareness.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
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).

<table>
<tr><td rowspan="2">Teaching and Learning Methodology</td><td colspan="4">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>Lecture</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Tutorial</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Homework assignments</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Experiment</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
</table>
</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Homework assignments</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Test</td><td>15%</td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>2. Experiment</td><td>20%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>3. Examination</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>

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

	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.	

January 2018

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.	

January 2018

Subject Description Form

Subject Code	ISE3004
Subject Title	Systems Modeling and Simulation
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with 1. the basic system concept and definitions of system; 2. techniques to model and to simulate various systems; 3. the ability to analyze a system and to make use of the information to improve the performance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand the system concept and apply functional modeling method to model the activities of a static system; b. understand the behavior of a dynamic system and create an analogous model for a dynamic system; c. simulate the operation of a dynamic system and make improvement according to the simulation results.
Subject Synopsis/ Indicative Syllabus	1. <u>System definitions and classification</u> Introduction to system definitions. System Classification. Components in a System. 2. <u>Basic Static and Dynamic System Modeling Techniques</u> Static System Modeling: IDEF0 (Input, Control, Output, Mechanism). Dynamic System Modeling: Stella (Stock, Flow, Converter). 3. <u>Introduction to Discrete Event Simulation</u> Analytical and Simulation Modeling, Simulation Worldviews, Preparation for Model Building. Generation of Random Number and Vitiate. Introduction to Distribution Functions, Fitting of Probability Distribution Function to Data. 4. <u>Applications of Discrete Event Simulation</u> Simulation Modeling with Probabilistic Functions. Applications of

<table>
<tr><td></td><td>Simulation in Business, Medical, Manufacturing and Transportation systems.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The emphasis of this subject is on application aspects and considerable efforts are needed on hand-on activities. Teaching is conducted through class lectures, tutorials, laboratory exercises and a mini-project in related to the application of simulation. The lectures are targeted at the understanding system concept, modeling methods, and different simulation techniques. Substantial works on laboratory exercises and tutorials are employed to enforce students' capabilities in building system models and application of simulation software. The mini-project is to give students a chance of conducting a simulation related project in a more comprehensive manner, and test/quiz is used to classify students' achievement in this subject.</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></td><td></td><td></td></tr>
<tr><td>Laboratory/Exercise</td><td>40%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mini-project/Case Study</td><td>30%</td><td></td><td></td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Test/Quiz</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></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Each laboratory exercise would be divided into two parts such that the group work would have to be submitted by the end of the laboratory class while the individual component can be hand-in afterward. Test/quiz will be given to access students' learning outcomes, and, a mini-project in related to application of simulation in practical situation.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/Seminar
2 hours/week for 6 weeks</td><td>12 Hrs.</td></tr>
<tr><td>▪ Tutorial/Hand-on Exercise
2 hours/week for 3 weeks</td><td>6 Hrs.</td></tr>
<tr><td>▪ Laboratory/Case Study/Test
3 hours/week for 5 weeks + 6 hours/week for 1 week</td><td>21 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Project report</td><td>31 Hrs.</td></tr>
</table>
</td></tr>
</table>

	▪ Self Study/Laboratory Report	52 Hrs.
	Total student study effort	122 Hrs.
Reading List and References	1. Zeigler, BP, Praehofer, H, Kim, TG 2000, *Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems*, Academic Press 2. Altiok, T, Melamed, B 2007, *Simulation Modeling and Analysis with Arena*, Academic Press 3. Evans, JR, Olson, DL 2001, *Introduction to Simulation and Risk Analysis*, Prentice Hall, New Jersey 4. Banks J. et al., 2010, *Discrete-Event System Simulation*, Pearson Education 5. Kelton, WD, Sadowski, R, Zupick, 2014, *Simulation with Arena*, McGraw-Hill	

Subject Description Form

Subject Code	ISE3013
Subject Title	Data Management in Aviation Industries
Credit Value	3
Level	3
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; 2. formulate models for quantitative analysis of managerial problems; 3. derive the data requirements of aviation management project; 4. identify the major applications and limitations of data management for the aviation industries; 5. apply data management techniques and tools for aviation management projects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. understand the basic principles of data management by demonstrating a basic level of knowledge regarding the practical use of Decision Support and Business Intelligence Systems for data management; b. convert a managerial decision problem into a model formulation to provide the necessary decision support information for practitioners in the aviation industries; c. formulate a data management plan in the context of aviation management; d. apply data management tools in the context of aviation management, showing a moderate level of skills in using related decision support and modeling applications.
Subject Synopsis/ Indicative Syllabus	1. <u>Introduction to Data Management</u> - Why Data Management is needed in the Aviation Industries - the data life cycle, data sharing requirements, naming conventions, metadata, storage, data ownership, security, privacy, and long-term access, basic concepts in data science and mathematical modeling. 2. <u>Data Visualization: Pattern Analysis</u> - Introduction to data visualization - Patterns and models through On-Line Analytical Processing (OLAP) and MS-Excel tools based on datasets gathered in the aviation

<table>
<tr><td></td><td>industries.

3. <u>Data Mining and Techniques for Operational and Managerial Data in the Aviation Industries</u>
- Beyond pattern analysis, performing complex data analysis
- Clustering;
- Single factor and two factor analysis;
- t- test and ANOVA test
- Moving average technique; Exponential smoothing (forecasting)
- Cases studies drawn from industrial and business applications in the Aviation Industries.</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>30%</td><td></td><td></td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Lab exercise</td><td>30%</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Test I, II</td><td>40%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
</table>
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 colspan="2">Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>3 hours/week x 6 weeks</td><td>18 Hrs.</td></tr>
<tr><td>▪ Lab and test</td><td>3 hours/week x 7 weeks</td><td>21 Hrs.</td></tr>
<tr><td colspan="2">Other student study effort:</td><td></td></tr>
</table>
</td></tr>
</table>

	▪ Preparation for the lab reports ▪ Preparation for tests and self-study	21 Hrs. 60 Hrs.
	Total student study effort	120 Hrs.
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. Taylor, B W III 2012, *Introduction to Management Science*, 11th ed., Prentice Hall 5. Winston, W L 2011, *Microsoft® Excel® 2010: Data Analysis and Business Modeling*, 3rd ed., Microsoft Press	

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

<table>
<tr><td></td><td>maintenance; Implementing Human Factors in 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. Individual Assignment (×3)</td><td>45%</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Group Project</td><td>20%</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4. Test</td><td>25%</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>
<tr><td>Student Study</td><td>Class contact:</td><td></td></tr>
</table>

Effort Expected	▪ Lectures	21 Hrs.
	▪ Laboratories	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	ME33001
Subject Title	Mechanics of Materials
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME23001 Engineering Mechanics; and ENG2001Fundamentals of Materials Science and Engineering
Objectives	To introduce the fundamental mechanics knowledge of solid materials under basic loading conditions. And to introduce practical approaches to solve for the stress and strain/deformation of solid materials under external mechanical loadings.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Solve for external forces and moments applied on a structure and determine the distribution of internal forces and moments in the structure by using free body diagrams and the laws of equilibrium. b. Recognize the crucial material and geometrical properties for a structural component under different types of loading, and solve for stress and deformation in a structural component due to axial loading, torsion, and bending acting individually or in combination. c. Evaluate the principal stresses in structural components subjected to a combined state of loading. d. Formulate and solve problems involving tension, compression, torsion or bending for statically indeterminate structural components.
Subject Synopsis/ Indicative Syllabus	***Fundamentals*** **-** Free Body Diagram; Equilibrium of a deformable body; General state of stress; Strain; Mechanical properties of materials. ***Axial Load*** **-** Saint-Venant's Principle; Axial elastic deformation; Principle of superposition; Statically indeterminate axially loaded member; Thermal stress. ***Torsion*** **-** Torsional deformation; Torsional Stress; Angle of twist; Statically indeterminate torque-loaded members. ***Bending*** **-** Equilibrium of beams; Shear force and bending moments; Flexural stresses; Beam deflection; Slope and deflection by method of superposition; Statically indeterminate systems. ***Combined Loading*** **-** Transformation of stresses; Principle stresses and maximum shear stress; Mohr's circle. Thin walled pressure vessels; Cylinders and spheres under internal and external pressures; Compounded cylinder; Stress distribution in beams; Stresses due to combined loads.

Laboratory Experiment
There are two 2-hour laboratory sessions.
Typical Experiments:
1. Torsion test
2. Deflection of beam

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge in relation to the topics as described in the section subject synopsis (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 d).

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 (Please tick as appropriate)			
		a	b	c	d
1. Assignment	25%	√	√	√	√
2. Laboratory report	5%	√			√
3. Test	10%	√	√	√	√
4. Examination	60%	√	√	√	√
Total	100%				

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

Overall Assessment:

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

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 ExpectedExpected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial/Laboratory	6 Hrs.
	Other student study effort:	
	▪ Course work	23 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	104 Hrs.
Reading List and References	1. R.C. Hibbeler, Mechanics of Materials, Pearson Prentice Hall, latest edition. 2. F.P. Beer, E.R. Johnston and Jr. J.T. DeWolf, Mechanics of Materials, McGraw-Hill, latest edition. 3. A.C. Ugural, A.C. and S.K. Fenster, Advanced Strength and Applied Elasticity, Prentice Hall, latest edition.	

Revised August 2014