School of Mechanical Engineering (SME)

Faculty of Engineering

Bachelor Of Engineering (Mechanical-Aeronautics)

ADMINISTRATION TEAM

Position	Name
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BACHELOR OF ENGINEERING (MECHANICAL-AERONAUTICS) PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (Mechanical-Aeronautics) is offered on a full-time basis at the UTM Main Campus in Johor Bahru. The duration of study for the full-time programme is subjected to the student's entry qualifications and lasts between four (4) years to a maximum of six (6) years.

The programme is offered on full-time basis and is based on a 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between twelve (12) to eighteen (18) credit hours per semester. Assessment is based on courseworks and final examinations given throughout the semester.

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BACHELOR OF ENGINEERING (MECHANICAL – AERONAUTICS) PROGRAMME SPECIFICATIONS

1.	**Programme Name**	Bachelor of Engineering (Mechanical – Aeronautics)
2.	**Final Award**	Bachelor of Engineering (Mechanical – Aeronautics)
3.	**Awarding Institution**	Universiti Teknologi Malaysia
4.	**Teaching Institution**	Universiti Teknologi Malaysia
5.	**Professional or Statutory Body of Accreditation**	Engineering Accreditation Council (EAC)
6.	**Language(s) of Instruction**	English
7.	**Mode of Study (Conventional, distance learning, etc.)**	Conventional
8.	**Mode of Operation (Franchise, self-govern, etc.)**	Self-govern
9.	**Study Scheme (Full Time / Part Time)**	Full Time

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10.	**Study Duration**		Minimum : 4 years Maximum : 6 years
Type of Semester		No of Semesters	No of Weeks/Semester
Normal		8	14
Short		1	8
11.	**Entry Requirements**		Matriculation/STPM/Diploma or equivalent
12.	**Programme Objectives (PEO)**		
	(i) Demonstrate academic and technological excellence professionally and globally, particularly in areas related to mechanical and aeronautical engineering practices and contribute innovatively to the nation's wealth creation. (ii) Career advancement by achieving higher levels of responsibility, leadership and acquiring professional and advanced academic qualifications. (iii) Recognize and practice professional, ethical, environmental and societal responsibilities and value different global and cultural aspects of their work and society. (iv) Adapt and communicate effectively and be successful working with multi disciplinary teams.		
13.	**Programme Learning Outcomes (PO)**		

(a) Technical Knowledge and Competencies		
Intended Learning Outcomes	**Teaching and Learning Methods**	**Assessment**
PO1		
Ability to acquire and apply fundamental knowledge of mathematics, science and engineering principles to solve complex mechanical and aeronautical engineering problems; Keywords: **Engineering Knowledge**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO2		
Ability to identify, formulate and analyse complex mechanical and aeronautical engineering problems; Keywords: **Problem Analysis**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO3		

Ability to design solutions for complex mechanical and aeronautical engineering problems that fulfil health, safety, societal, cultural and environmental needs; Keywords: **Design/Development of Solutions**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO4		
Ability to investigate complex mechanical and aeronautical engineering problems using research-based knowledge and methods to produce conclusive results; Keywords: **Investigation**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.

(b) Generic Skills		
Intended Learning Outcomes	**Teaching and Learning Methods**	**Assessment**
PO5		
Ability to use modern engineering and information technology (IT) tools in complex mechanical and aeronautical engineering activities, with an understanding of limitations; Keywords: **Modern Tools Usage**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO6		
Ability to apply complex professional mechanical and aeronautical engineering problems and practice related to societal, health, safety, legal and cultural issues with full responsibility and integrity Keywords: **The Engineer and Society**	Lectures, tutorials, seminars, group projects and industrial training.	Industrial training and group project reports.
PO7		

Ability to identify the impact of complex mechanical and aeronautical engineering problems and solutions on sustainability and demonstrate the needs for sustainable development in societal and environmental contexts Keywords: **Environment and Sustainability**	Tutorials, laboratory works, group assignments and projects, final year project presentations and problem-based learning.	Group reports, learning logs/diaries and oral presentations.
PO8		
Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice; Keywords: **Ethics**	Lectures, tutorials, seminars, group projects and industrial training.	Industrial training and group project reports.
PO9		
Ability to communicate effectively on complex mechanical and aeronautical engineering activities both orally and in writing; Keywords: **Communication**	Seminars, assignments and final year projects.	Report and theses.
PO10		
Ability to work productively as an individual, and as a member or leader in a team that may involve multi-disciplinary settings; Keywords: **Team Working**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.
PO11		
Ability to undertake life-long learning and manage information including conducting literature study; Keywords: **Life Long Learning**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.

PO12		
Ability to demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skill; Keywords: **Project Management, Finance & Entrepreneurship**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.

14.	**Classification of Courses**		
No.	**Classification**	**Credit Hours**	**Percentage**
i.	Programme Core	72	51.43
ii.	Programme Electives	45	32.14
iii.	Compulsory University Courses	23	16.43
	Total	**140**	**100**
Classification of courses for engineering programme			
A	Engineering Courses	117	83.6
	Total credit hours for Part A	**117**	
B	Non-Engineering	23	16.4
	Total credit hours for Part B	**23**	
	Total credit hours for Part A and B	**140**	**100**
15.	**Total Credit Hours to Graduate**	**140**	

AREAS OF STUDY

Aeronautical engineering encompasses all aspects of studies related to flying. In this aspect, flying includes aerospace flight. The areas of specialisation in Aeronautical Engineering can be divided into the following:-

a) Aerodynamics

Aerodynamics is the relationship between air (wind) and the material (solid) that moves in it. Various principles of Fluid Mechanics are considered in a flying problem. For example, aerodynamic study will determine a suitable shape for an aircraft, missile etc.

b) Aircraft structure

This area will determine the integrity (strength) of a flying body such as an aircraft or a missile. Using dimensions and tolerances, strength of material, shear flow and theory of thin plate, the structure of an aircraft can be determined.

c) Aircraft propulsion

Propulsion is a study of an aircraft powerplant. This study includes design and selection of appropriate power plant for a particular aircraft. This field has developed vastly since the increase in the cost of petroleum. Engineer shave been competing to invent lighter and more economic power plants.

d) Aircraft instrumentation and Avionics

Avionics is the acronym for `Aviation Electronics' and together with aircraft instrumentation they involve a wide range of studies. Flying has been facilitated by the use of various electronic devices. Electronic devices, which facilitate flying such as radars ILS (Instrument Landing System) ADF (Automatic Direction Finder) etc., were specifically invented by the Avionic/Aircraft Instrument Engineer. The Avionic/Aircraft Instrument Engineer will have to ensure that the instrument fitted on an aircraft will function satisfactorily together with a high degree of reliability.

e) Management

The aircraft industry has expanded tremendously during this decade. The industry requires experts to manage and administer its operation smoothly. Regulations concerning the construction and operations of

aircraft have been so devised in order to avoid accidents and mistakes which may sacrifice lives.

f) Transportation

Apart from transporting passengers an aircraft is also used as cargo carriers, ambulance etc. Study in this area trains transportation experts to modify flight schedule and load so that the aircraft can be used economically.

g) Flight Regulations

To avoid accidents the flying fraternity has formulated special laws for flying. Briefly the laws are divided into two, namely military flight regulations and public flight regulations.

h) Materials for Aircraft

This field focuses its study on selecting and determining metals, plastic, composites, etc. which are suitable for building an aircraft, rocket etc.

i) Flight Mechanics

Flight mechanics is an important aspect in the design and operation of an aircraft flight mission. Research area includes aircraft performance (take-off, climbing, cruising, decent and landing) and aircraft static stability and control in steady flight condition.

j) Flight Dynamics and Control

The area is about the dynamics behaviour of rigid body aircraft and the application of control system theory to design simple stability augmentation systems to more complex automatic flight control systems. This includes the application of modern multivariable control system design using state-space methods. The area includes the equation of motion of rigid body including translation aircraft longitude in a land lateral dynamic stability, flying and handling qualities, stability augmentation and automatic flight control system, aerodynamics stability derivatives and multivariable state-space methods.

CAREER PROSPECTS

Graduates of this programme are essentially Mechanical Engineers but those with specialisation to Aeronautical Engineering can easily find job opportunities in various sectors. Alternatively, they can also be known as Aeronautical Engineers depending on their job placements in industries they are in.

The Aeronautical Engineering programme was first offered by UTM during the 1980/81 session, jointly run by UTM and TUDM. Its objective was to fulfil the need for skilled and semi-skilled human resources in the aeronautical field especially in the public sector. TUDM required human resources to operate, maintain, repair, oversee and manage different types of aircraft and UTM had the capability to produce graduates in this field. This need has continued to increase with the development in the airline industry in Malaysia which demands for more trained manpower especially engineers and technical assistants.

The Aeronautical Engineering programme at UTM is offered as a specialisation of mechanical engineering and covers five main areas namely aerodynamics, aircraft Structure, flight dynamics and control, propulsion and aircraft design. Thus, graduates of this programme satisfy the requirement to graduate as an engineer in Mechanical Engineering as well as in the field of specialisation in aeronautics. Apart from TUDM, the Civil Aviation Department requires trained manpower to supervise flying activities in Malaysia. Other organisations that require graduates in the field of aeronautics include Malaysia Airline System, AirAsia, AIROD, Eagle Aircraft, SME Aviation, Malaysia Helicopter Services (MHS), TLDM and PDRM Air Unit. Several other firms also have working opportunities in the airline industry.

In the field of academic and research opportunities is available for Aeronautical Engineers to serve in any institution that runs courses and research in the field of Aeronautics. Several other universities and institutions in Malaysia have started to offer programme in the field of Aeronautics too. Due to the rapid expansion in the airline industry, many airline companies, flying clubs and firms are prepared to get involved actively in the airline industry of the country by offering more job opportunities to UTM graduates.

Award Requirements

To graduate, students must:

- Attain a total of not less than 140 credit hours with a minimum CGPA of 2.00.
- Has passed all specified courses.
- Has applied for graduation and has been approved by the University.
- Has completed all four (4) short courses and one (1) test in UTM Professional Skills Certificate Programme.
- Other condition as specified.

Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Engineering (Mechanical - Aeronautics) are as follows:

1. Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

University General Requirements:

i. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.

ii. Passed the Malaysian High School Certificate (STPM) or its equivalent and obtained the following:

a) **Grade C (NGMP 2.00)** General Studies/General Paper, and

b) **Grade C (NGMP 2.00)** in two (2) other subjects

iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

Programme Specific Requirements

i. Obtained a **CGPA of 2.80**; and Passed with a minimum **Grade B- (NGMP 2.67)** in two (2) of the following subjects:

a) Mathematics T / Further Mathematics

b) Physics or Chemistry

ii. Passed with at least a **Grade C** in Mathematics and Physics in the SPM level or equivalent.

iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.

iv. Do not have any health problems that may affect their studies.

2. Minimum requirements for **Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation** (fulfil the general requirements set by the university as well as other conditions of the programme).

General University Requirements

i. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.

ii. Passed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation with a minimum **CGPA of 2.00** and passed all the core subjects.

iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

Programme Specific Requirements

i. Obtained a **CGPA of 2.80**; and Passed with a **Grade B- (2.67)** in two (2) of the following subjects:

a) Mathematics / Engineering Mathematics

b) Physics / Engineering Physics or Chemistry / Engineering Chemistry

ii. Passed with at least a **Grade C** in Mathematics and Physics in the

SPM level or equivalent.

iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.

iv. Do not have any health problems that may affect their studies.

3. Minimum qualifications for students with **Certificates/Diplomas** (fulfil the general requirements set by the university as well as specific requirements of the programme).

General University Requirements

i. Obtained a Diploma or equivalent qualification recognised by the Malaysian Government and approved by the Senate.

or

ii. Passed STPM examination in 2016 or before and obtained at least:

a) **Grade C (NGMP 2.00)** General Studies/General Paper, and

b) **Grade C (NGMP 2.00)** in two (2) other subjects

or

iii. Passed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation in 2017 or before and obtained minimum **CGPA of 2.00.**

iv. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

v. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.

Programme Specific Requirements

i. Obtained a Diploma in Mechanical Engineering from UTM or equivalent with minimum **CGPA of 2.75**.

or

ii. For those who obtained a **CGPA of less than 2.75** but have at least **two (2)** years working experience in related field are eligible to apply.

or

iii. Meet the minimum entry requirements as required for STPM holders.

or

iv. Meet the minimum entry requirements as required for those who have completed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation.

v. Passed with at least a **Grade C** in Mathematics and Physics in the SPM level or equivalent.

or

vi. Obtained at least a **C Grade (2.00)** in any one of the Mathematic courses at Diploma level.

v. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.

vii. Do not have any health problems that may affect their studies.

Note:

Candidates are required to submit the results transcript of all their examinations taken during their Diploma study (semester one until the final semester) to UTM. A copy of the diploma or a letter of completion of study will also have to be submitted together with their applications.

Year of entry and duration of study will be based on the credit exemptions approved by the UTM.

Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

Code	Intended Educational Objectives
PEO1	Demonstrate academic and technological excellence professionally and globally, particularly in areas related to mechanical and aeronautical engineering practices and contribute innovatively to the nation's wealth creation.
PEO2	Career advancement by achieving higher levels of responsibility, leadership and acquiring professional and advanced academic qualifications.
PEO3	Recognize and practice professional, ethical, environmental and societal responsibilities and value different global and cultural aspects of their work and society.
PEO4	Adapt and communicate effectively and be successful working with multi-disciplinary teams.

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

Code	Intended Learning Outcomes
PLO1	Ability to acquire and apply fundamental knowledge of mathematics, science and engineering principles to solve complex mechanical and aeronautics engineering problems; Keywords: **Engineering Knowledge**
PLO2	Ability to identify, formulate and analyse complex mechanical and aeronautics engineering problems; Keywords***:*** **Problem Analysis**
PLO3	Ability to design solutions for complex mechanical and aeronautics engineering problems that fulfil health, safety, societal, cultural and environmental needs; Keywords: **Design/Development of solutions**

PLO4	Ability to investigate complex mechanical and aeronautics engineering problems using research-based knowledge and methods to produce conclusive results; Keywords: **Investigation**
PLO5	Ability to use modern engineering and information technology (IT) tools in complex mechanical and aeronautics engineering activities, with an understanding of the limitations; Keywords: **Modern Tools Usage**
PLO6	Ability to apply complex professional mechanical and aeronautics engineering problems and practice related to societal, health, safety, legal and cultural issues with full responsibility and integrity; Keywords: **The Engineer and Society**
PLO7	Ability to identify the impact of complex mechanical and aeronautics engineering problems and solutions on sustainability and demonstrate the needs for sustainable development in societal and environmental contexts Keywords: **Environment & Sustainability**
PLO8	Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. Keywords: **Ethics**
PLO9	Ability to communicate effectively on complex mechanical and aeronautics engineering activities both orally and in writing; Keywords: **Communication**
PLO10	Ability to work productively as an individual, and as a member or leader in a team that may involve multi-disciplinary settings; Keywords: **Team Working**
PLO11	Ability to undertake life-long learning and manage information including conducting literature study; Keywords: **Life Long Learning**
PLO12	Ability to demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skill; Keywords: **Project Management, Finance & Entrepreneurship**

PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are required to enroll in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) during the duration of their studies in UTM. The four (4) short courses and one test are as follows:

1. How to Get Yourself Employed (HTGYE)
2. ISO 9001: 2008 Quality Management System Requirement (ISO)
3. Occupational Safety and Health Awareness (OSHA)
4. How to Manage Your Personal Finance (HTMYPF)
5. Test of English Communication Skills for Graduating Students (TECS):
   (i) TECS 1001 (Paper I – Oral Interaction)
   (ii) TECS 1002 (Paper II - Writing)

MOBILITY PROGRAMME (OUTBOUND)

Universiti Teknologi Malaysia (UTM) is offering five (5) types of mobility programs which allow UTM Student to go abroad and join academic programs in universities, institutions or organizations in all over the world. The opportunities offered are as below:

1. Study Abroad / Student Exchange

Study Abroad/Student Exchange programme is a programme which allow student to spend one or two semesters at universities abroad and take courses in regular semester with credit transfer opportunity.

2. Research Internship Abroad

Research Internship is a program which allow student to join research study or internship under the supervision of an academic staff at universities or industries abroad from all over the world.

3. Global Outreach Programme (GOP)

GOP is a 7 to 14 days academic based program to experience various cultures in other countries. It includes immersion elements such as research & academic activities, social responsibility and cross cultural activities.

4. International Invitation Programme

Students participate in program organised by international institutions/ organisations with the following themes:

(i) Seminar, Conference or Paper Presentation
(ii) Cultural Exhibition and Conference
(iii) Student Development Activity

5. Summer School Abroad

Summer School program is a program which is designed to provide educational opportunities in 4 to 8 weeks during summer holiday abroad. It is related to environment, local community, heritage and tradition.

Details and appropriate forms and procedures can be reached at **UTM International link: http://www.utm.my/international/outbound-mobility-programs/**

COURSE MENU

YEAR 1 : SEMESTER 1						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 1203	Static*	3	1	0	3	
SEMM 1503	Engineering Drawing	1	0	6	3	
SEMM 1911	Experimental Methods	1	0	0	1	
SEMM 1921	Introduction to Mechanical Engineering	1	0	0	1	
SEEU 1002	Electrical Technology	2	1	0	2	
SSCE 1693	Engineering Mathematics I	3	1	0	3	
UHIS 1022	Philosophy and Current Issues (Local student)	2	0	0	2	
UHIS 1022/ UHMS 1182	Philosophy and Current Issues/ Appreciation of Ethics and Civilization (International Student)	2	0	0	2	
UHLB 1112	English Communication Skills	3	0	0	2	
		Total			**17**	

YEAR 1 : SEMESTER 2						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 1013	Programming for Engineers	3	0	0	3	
SEMM 1113	Mechanics of Solids I*	3	1	0	3	SEMM 1203
SEMM 1213	Dynamics*	3	1	0	3	SEMM 1203
SEMM 1513	Introduction to Design	2	0	3	3	SEMM 1503

UHMS 1182	Appreciation of Ethics and Civilisations (Local Student)	2	0	0	2	
UHLM 1012	Malay Language for Communication 2 (International student)	2	0	0	2	
UHMT 1012	Graduate Success Attributes	2	0	0	2	
		Total			**16**	

YEAR 2 : SEMESTER 1						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 2123	Mechanics of Solids II*	3	1	0	3	SEMM 1113
SEMM 2313	Mechanics of Fluids I*	3	1	0	3	SEMM 1203, SEMM 1013**
SEMM 2413	Thermodynamics*	3	1	0	3	
SEMM 2921	Laboratory I	0	0	2	1	SEMM 1911
SSCE 1993	Engineering Mathematics II	3	1	0	3	SSCE 1693
UHIT 2302	Thinking of Science and Technology	2	0	0	2	
UHLB 2122	Academic Communication Skills	3	0	0	2	UHLB 1112
		Total			**17**	

YEAR 2 : SEMESTER 2						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 2223	Mechanics of Machines & Vibration*	3	1	0	3	SEMM 1213
SEMM 2323	Mechanics of Fluids II*	3	1	0	3	SEMM 2313
SEMM 2433	Applied Thermodynamics and Heat Transfer*	3	1	0	3	SEMM 2413
SEMM 2613	Materials Science	3	1	0	3	
SSCE 2193	Engineering Statistics	3	1	0	3	
SSCE 1793	Differential Equations	3	1	0	3	SSCE 1693
		Total			**18**	

YEAR 3 : SEMESTER 1						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 2713	Manufacturing Processes	3	1	0	3	
SEMM 3023	Applied Numerical Methods	3	0	0	3	SEMM 1013, SSCE 1793
SEMM 3233	Control Engineering	3	0	0	3	SEMM 1213**, SSCE 1793**
SEMM 3622	Material Technology	2	0	0	2	SEMM 2613
SEMM 3931	Laboratory II	0	0	3	1	SEMM 2921
SEMT 3333	Aerodynamics	3	1	0	3	SEMM 2323**
UBSS 1032	Introduction to Entrepreneurship	2	0	0	2	
		Total			**17**	

YEAR 3 : SEMESTER 2						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 3033	Finite Element Methods	3	0	0	3	SEMM 1113**
SEMM 3941	Laboratory III	0	0	3	1	SEMM 3931
SEMT 3132	Aircraft Structure I	2	0	0	2	SEMM 2123*
SEMT 3212	Flight Mechanics	2	0	0	2	SEMT 3333**
SEMT 3423	Aircraft Propulsion System	3	0	0	3	SEMM 2413
SEMT 3822	Aviation Management	2	0	0	2	
SKEU 2012	Electronics	2	0	0	2	SEEU 1002
UHLB 3132	Professional Communication Skills	3	0	2	2	UHLB 2122
		Total			**17**	

SHORT SEMESTER						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 3915	Industrial Training				5	##, SEMM 2123**, SEMM 2223**, SEMM 2323**, SEMM 2433**
		Total			**5**	

YEAR 4 : SEMESTER 1						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 4912	Undergraduate Project I	0	0	6	2	SEMM 2123**, SEMM 2223**, SEMM 2323**, SEMM 2433**

SEMT 4253	Aircraft Instrumentation and Avionics	3	0	0	3	SKEU 2012
SEMT 4223	Flight Dynamics & Control	3	0	0	3	SEMT 3212**, SEMM 3233,SKMF3333
SEMT 4513	Aircraft Design I	2	0	3	3	SEMM 1513, SEMT 3212
SEMT 4143	Aircraft Structure II	3	0	0	3	SEMT 3132
UKQF 2xx2	Co-curriculum and Service Learning Elective	0	0	3	2	
		Total			**16**	

YEAR 4 : SEMESTER 2						
CODE	**COURSE**	**L**	**T**	**P/S**	**CREDIT**	**PRE-REQUISITE**
SEMM 4924	Undergraduate Project II	0	0	12	4	SEMM 4912
SEMM 4902	Engineering Professional Practice	0	0	2	2	Must be 3rd year
SEMT 4523	Aircraft Design II	2	0	3	3	SEMT 4513, SEMT 4143**
SEMT 4813	Aviation Economy	3	0	0	3	
UXXX 2xx2	Generic Skills or Knowledge Expansion Cluster Elective	2	0	0	2	
UKQT 3001	Extra-curricular experiential Learning	1	0	0	1	
UHLX 1112	Language Skills Elective (Foreign Language)	2	0	0	2	
		Total			**17**	

Subject to changes

** Minimum grade D- (30%) in the pre-requisite courses
Obtained minimum of 80 credits
* Core Course - minimum passing grade is C (50%)
Notes: L – Lecture, T – Tutorial, P/S – Practical/Studio

GRADUATION CHECKLIST

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the course are not allowed to graduate.

NO	COURSE CODE	COURSE NAME	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (/) IF PASSED
MECHANICAL ENGINEERING COURSES					
1	SEMM 1013	Programming for Engineers	3	3	
2	SEMM 1113	Mechanics of Solids I	3	3	
3	SEMM 1203	Statics	3	3	
4	SEMM 1213	Dynamics	3	3	
5	SEMM 1503	Engineering Drawing	3	3	
6	SEMM 1513	Introduction to Design	3	3	
7	SEMM 1911	Experimental Methods	1	1	
8	SEMM 1921	Introduction to Mechanical Engineering	1	1	
9	SEMM 2123	Mechanics of Solids II	3	3	
10	SEMM 2223	Mechanics of Machines & Vibration	3	3	
11	SEMM 2313	Mechanics of Fluids I	3	3	
12	SEMM 2323	Mechanics of Fluids II	3	3	
13	SEMM 2413	Thermodynamics	3	3	
14	SEMM 2433	Applied Thermodynamics & Heat Transfer	3	3	
15	SEMM 2613	Materials Science	3	3	
16	SEMM 2713	Manufacturing Processes	3	3	
17	SEMM 2921	Laboratory I	1	1	
18	SEMM 3023	Applied Numerical Methods	3	3	
19	SEMM 3033	Finite Element Methods	3	3	
20	SEMM 3233	Control Engineering	3	3	
21	SEMM 3622	Materials Technology	3	3	

22	SEMM 3915	Industrial Training	5	HL	
23	SEMM 3931	Laboratory II	1	1	
24	SEMM 3941	Laboratory III	1	1	
25	SEMM 4902	Engineering Professional Practice	2	2	
26	SEMM 4912	Undergraduate Project I	2	2	
27	SEMM 4924	Undergraduate Project II	4	4	
28	SEMT 3132	Aircraft Structure I	2	2	
29	SEMT 3212	Flight Mechanics	2	2	
30	SEMT 3333	Aerodynamics	3	3	
31	SEMT 3423	Aircraft Propulsion System	3	3	
32	SEMT 3822	Aviation Management	2	2	
33	SEMT 4143	Aircraft Structure II	3	3	
34	SEMT 4223	Flight Dynamics & Control	3	3	
35	SEMT 4253	Aircraft Instrumentation & Avionics	3	3	
36	SEMT 4513	Aircraft Design I	3	3	
37	SEMT 4523	Aircraft Design II	3	3	
38	SEMT 4813	Aviation Economy	3	3	
		TOTAL CREDIT FOR MECHANICAL ENGINEERING COURSES (A)	**101**	**96**	
ELECTRICAL COURSES (School of Electrical Engineering)					
1	SEEU 1002	Electrical Technology	2	2	
2	SEEU 2012	Electronics	2	2	
		TOTAL CREDIT FOR ELECTRICAL COURSES (B)	**4**	**4**	
MATHEMATICS COURSES (Faculty of Science)					
1	SSCE 1693	Engineering Mathematics I	3	3	

2	SSCE 1793	Differential Equations	3	3	
3	SSCE 1993	Engineering Mathematics II	3	3	
4	SSCE 2193	Engineering Statistics	3	3	
		TOTAL CREDIT FOR MATHEMATICS COURSES (C)	**12**	**12**	
UNIVERSITY GENERAL COURSES					
CLUSTER 1: APPRECIATION OF PHILOSOPHY, VALUE & HISTORY					
1	UHIS 1022	Philosophy and Current Issues (for local students only)	2	2	
	UHIS 1022/ UHMS 1182	Philosophy and Current Issues/ Appreciation of Ethics and Civilisations (for international students only)			
2	UHMS 1182	Appreciation of Ethics and Civilisations (for local students only)	2	2	
	ULAM 1012	Malay Language for Communication 2 (for international students only)			
CLUSTER 2: GENERIC SKILLS					
1	UHMT 1012	Graduate Success Attributes	2	2	
2	UHMT 2012	Leadership	2	2	
3.	UHMS 2022	Critical and Creative Thinking	2	2	
4.	UHMS 2032	The Human side of Knowledge Management	2	2	
5.	UHMS 2042	Development and Global Issues	2	2	

6.	UHMT 2042	Guidance & Counselling	2	2	
7.	UHMT 2062	Psychology of Adjustment	2	2	
8.	UBSS 2072	Fundamentals of Intellectual Property Law	2	2	
9.	UBSS 2082	Law for Entrepreneurs	2	2	
10.	UBSS 2092	Entrepreneurship and Enterprise Development	2	2	
11.	UBSS 2102	Social Entrepreneurship	2	2	
12.	UHMS 2112	Engineering Communication	2	2	
13.	UHMS 2122	Human Communication	2	2	
14.	UHMT 2132	Professional Ethics	2	2	
15.	UMJT 2142	Professional Ethics, Safety and Health (Ningen Ryoku)	2	2	
CLUSTER 3: KNOWLEDGE EXPANSION					
1.	UHIT 2302	Science and Technology Thinking	2	2	
2.	UHIT 1022	Science, Technology and Mankind	2	2	
3.	UHII 2012	Al-Qur'an and Human Civilization	2	2	
4.	UHIT 2032	Life Institutions and Sustainable Development	2	2	
5.	UHIZ 2042	Future Studies	2	2	
6.	UHIT 2052	Family Law	2	2	
7.	UHIZ 2062	World Scinece	2	2	
8.	UHIS 2072	Sustainable Economy	2	2	
9.	UHIS 2082	Practice and Concept of Halal Management	2	2	

10.	UHII 2092	Philosophy of Islamic Art	2	2	
11.	UHII 2102	Islam and Health	2	2	
12.	UHII 2132	Islamic Entrepreneurship	2	2	
13.	UETS 2142	Sustainable Energy	2	2	
CLUSTER 4: CO-CURRICULUM & SERVICE LEARNING					
1	UKQX xxx2	Co-curriculum & Service Learning Elective	2	2	
2	UKQE 3001	Extra-Curricular Experiential Learning	1	1	
CLUSTER 5: LANGUAGE SKILLS					
1	UHLB 1112	English Communication Skills	2	2	
2	UHLB 2122	Academic Communication Skills	2	2	
3	UHLB 3132	Professional Communication Skills	2	2	
4	UHLB 1032	Introductory Academic English	2	2	
5	UHLB 1042	Intermediate Academic English	2	2	
6	UHLA 1112	Arabic Language	2	2	
7	UHLJ 1112	Japanese Language 1	2	2	
8	UHLC 1112	Mandarin Language I	2	2	
9	UHLF 1112	French Language	2	2	

10	UHLN 1112	Persian Language	2	2	
11	UHLJ 1122	Japanese Language for Communication I	2	2	
12	UHLM 1112	Malay Language for Communication	2	2	
CLUSTER 6: ENTREPRENEURSHIP					
1	UBSS 1032	Introduction to Entrepreneurship	2	2	
TOTAL CREDIT FOR UNIVERSITY GENERAL COURSES (D)			**23**	**23**	
TOTAL CREDIT TO GRADUATE (A + B + C + D)			**140**	**135**	
Note: # Choose one elective either from Cluster 2 (Generic Skills) or Cluster 3 (Knowledge Expansion) for UxxX 2xx2					
OTHER COMPULSORY COURSES					
PROFESSIONAL SKILLS CERTIFICATE (PSC)					
1	GLL 1001	How To Get Yourself Employed			
2	GLL 1029	ISO 9001:2008 Quality Management System Requirement			
3	GLL 1040	Occupational Safety, Health and Environment			
4	GLL 1041	How to Manage Your Personal Finance			
5	Test of English Communication Skills (TECS)				
	TECS 1001	Oral Interaction			
	TECS 1002	Writing			

COURSE SYNOPSIS FOR B. ENG (MECHANICAL – AERONAUTICS)

SEMT 3132 Aircraft Structures I
The course will give the student an introduction to the various types of structural components used in aircraft, together with their functions and stress calculations under different types of loading. The lectures will include qualitative descriptions of methods of fabrication and provide a thorough introduction to quantitative methods of analysis. The first section covers the analysis of the statically determinate and indeterminate structure including the various type of truss analysis. Next section covers the analysis of the opened, closed and thin wall beam structure peculiar to aircraft, features discussion on the effect of the various types of load exerted and an introduction to structural idealization. Finally, this section also investigates the stress analysis of the multi-cell structures due to the acting loads and its design characteristics. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems of aircraft structures.

SEMT 3212 Flight Mechanics
Flight mechanics is an important aspect in the design and operation of an aircraft. A flight mission can only be operated successfully and safely if proper efforts are given to this aspect. Therefore, in this course students will be equipped with the fundamental concept of aircraft performance calculation and static stability determination needed to analyze and design modern aircraft. Proper due shall be given to both aspects of performance and static stability. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems in flight mechanics and industrial visit of related industries.

SEMT 3333 Aerodynamics
The course gives an introduction to aerodynamics with specific emphasis to aircraft aerodynamics. The purpose is to instill understanding of the principle of aerodynamics and to provide foundation of fundamental aerodynamics analysis. The contents include: Fluid flow equations (Continuity equation, Euler and Navier Stokes equations); Inviscid flow theory and Joukowski transformation; 2D aerofoil theory (Vortex law, Biot-Savart law, thin aerofoil theory, Fourier theory, thick and cambered aerofoil); Finite wing theory (Vortex system and horseshoe vortex, downwash and lift distribution); Viscous Flow Theory and Boundary Layer; Introduction to industrial aerodynamics (vehicles and buildings).It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems of aerodynamics.

SEMT 3423 Aerospace Propulsion System
An introduction to aircraft propulsion system including the historical background, review of thermodynamics and fluid mechanics; fundamental of gas dynamics; piston engines; shaft and thrust power; cycle analysis: air standard and cycle with friction; turbojet engine cycle; turbofan engine cycle; gas turbine engine components and their functions; compressor and turbine velocity diagram analysis; turbine blades cooling techniques; gas turbine emissions; chemical rocket engines. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems of aircraft propulsion system.

SEMT 3822 Aviation Management
This course covers basic management concepts such as Planning, Organizing, Leading and Controlling; Management of the aviation industry; the process of airworthiness; airport operations; aviation organizations and rules; safety, liability and security in aviation industries; main activities of the aircraft manufacturer, main activities of the airline industry. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems in aviation and industrial visit of related industries.

SEMT 4143 Aircraft Structures II
This course gives students an understanding of the basic principles in the analysis of aircraft structural components and the determination of their strengths under the various operational loading conditions. It covers the areas of thin plate analysis, analysis of structural instability, introduction to the analysis of unidirectional composites, introduction to aeroelasticity and fatigue of aircraft structures. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems of aircraft structures.

SEMT 4223 Flight Dynamics and Control
This course is about the dynamics behaviour of rigid body aircraft and the application of control system theory to design simple stability augmentation systems to more complex automatic flight control systems. This includes the application of modern multivariable control system design using state-space methods. Topics include axes system and notation, equation of motion of rigid body including translation, aircraft longitudinal and lateral dynamic stability, flying and handling qualities, stability augmentation and automatic flight control system, aerodynamics stability derivatives and multivariable state-space methods. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based

on real problems in aircraft dynamics and control, which also comprising The Fourth Industrial Revolution (*IR 4.0*) element.

SEMT 4253 Aircraft Instrumentation and Avionics
Aircraft Instrumentation and Avionics course provides the understanding of various basic instrument and electronics used in aircraft. The major topics cover includes an introduction to instrumentation system, component of instrumentation, air data, calibration equations, gyroscopes, indicators, signal conditioning, data acquisition system, transducers, Introduction to avionics, GPS application. The devices that will be thought are such as ADF, VOR, DME, LORAN C, ILS, RADAR Altimeter, GPS and Primary RADAR.It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems in aircraft instrumentation and avionics, which also comprising The Fourth Industrial Revolution (*IR 4.0*) element.

SEMT 4513 Aircraft Design I
The course will allow students to learn methodology and decision making in aircraft design process. This Integrated Design Project (IDP) offers a distinctive opportunity to use knowledge and skill from previous studies in aeronautics class to conduct a practical aircraft design project. Contents of learning include feasibility study, aircraft aerodynamics, aircraft performance & stability and component design.

SEMT 4523 Aircraft Design II
This course gives students an exposure to the aircraft design process and methodology. Students are split into a number of groups to carry out aircraft components design and analyses. The progress of this Integrated Design Project (IDP) is closely monitored by the lecturers. Lectures are given to provide the student with information and guidance as project goes along. Group presentation and feedback from lecturers are regularly arranged for student evaluation and design improvement.

SEMT 4813 Aviation Economy
This course aims to expose Aeronautical engineering students with fundamental elements of economics commonly used in engineering and aviation. The course begins by introducing key economic concepts such as the cash flow diagram and factors in engineering economy. These fundamental concepts are applied on various decision making tools such as Net Present Value, Future Worth, Annual Worth, Rate of Return and Benefit/Cost Analysis to solve aviation economics related problems. It is a blended course that combines traditional teaching methods to Problem-Based Learning (PBL) approach based on real problems in aviation and industrial visit of related industries.