COURSE INFORMATION

School/ Faculty:	School of Mechanical Engineering / Faculty of Engineering	**Page:**	1 of 6
Course code:	SEMT 3212	**Academic Session/Semester:**	20182019/1
Course name:	Flight Mechanics	**Pre/co requisite (course name and code, if applicable):**	Aerodynamics (SEMT 3333)
Credit hours:	2		

Course synopsis	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.			
Course coordinator (if applicable)	Ir. Dr.-Ing. Mohd Nazri bin Mohd Nasir			
Course lecturer(s)	**Name**	**Office**	**Contact no.**	**E-mail**
	Ir. Dr.-Ing. Mohd Nazri bin Mohd Nasir	Hangar helicopter	011-10845041	mnazrimnasir@utm.my

Prepared by: Name: Ir. Dr.-Ing. Mohd Nazri bin Mohd Nasir Signature:  Date: 25/10/2021	Certified by: Name: Prof. Ir. Dr. Pakharuddin Md Samin Signature: Date:

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Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO (CODE)	*Taxonomies and **generic skills	T&L methods	***Assessment methods
CLO1	Outline the effect of atmospheric condition to airplane and its propulsion system.	PLO1 (KW)	C4	Lecture, Active Learning	T, Q, F
CLO2	Apply correct aerodynamics theory to aircraft performance of a fixed-wing low speed aircraft.	PLO2 (THPA)	C3	Lecture, Active Learning	T, Q, F
CLO3	Calculate and analyse aircraft performance for steady level flight, climb, glide, take off, landing, range and endurance	PLO1 (KW)	C4	Lecture, Active Learning	T, Q, F
CLO4	Calculate and analyse aircraft longitudinal static stability for low speed aircraft	PLO2 (THPA)	C4	Lecture, Active Learning	T, Q, F
CLO5	Demonstrate how to produce, fabrication and flying of a model aircraft	PLO2 (THPA), PLO10 (TW),	C3 (TH3),P6 (TW2)	Lab demonstration, Active Learning/Collaborative Learning	ASG, PR

Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement
***T – Test; Q – Quiz; ASG– Assignment; HW – Homework; PR – Project; Pr – Presentation; F – Final Exam etc.

Details on Innovative T&L practices:

No.	Type	Implementation

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1.	Active learning	Conducted through in-class activities
2.	Project-based learning	Conducted through design assignments. Students in a group of 3 or 4 are given 1 project that requires students to organise an industrial visit to selected industries.

Weekly Schedule:

Week 1	**Introduction to Aircraft Performance** Airworthiness and Standards
Week 2	**Review of Standard Atmosphere model**. Airspeed measurements and instrumentation (altimeter, airspeed indicator, Pitot tube etc.). Engine characteristics (Turbojet, Piston-prop, Turbofan and Turboprop)
Week 3	**Basic Aerodynamics**. Aerodynamics forces and coefficient (Lift, Drag, Thrust), Drag Equation – Total Drag (induce drag, skin friction drag, form drag, etc.), drag coefficient
Week 4	**Thrust and Power required.** Minimum thrust and power conditions. Straight and level flight – equation of motion of cruise flight, drag equation, performance in term of thrust and power.
Week 5	**Climbing Flight** – Climbing at shallow angle, rate of climb, time to climb and climb gradient.
Week 6	**Gliding Flight** – gliding for maximum distance, gliding for maximum duration, sinking speed, and time to descend.
Week 7	**Range and Endurance** – definition of range and endurance, equation for range and maximum range, equation for endurance and maximum endurance.
Week 8	Mid-Semester Break
Week 9	**Take-off and Landing**. Other accelerated flights (steady banked turned, dive and pull-out)
Week 10	**Introduction to aircraft static stability and control**.
Week 11	**Longitudinal static stability** - equilibrium condition, static stability analysis, criteria for longitudinal static stability, tail lift curve.
Week 12	**Longitudinal Control** – trim, sticks fixed and sticks free stability, static margin.
Week 13	**Lateral static stability** – directional, sideslip and roll static stability, dihedral effect and fin sizing
Week 14	**Lateral control** – directional, roll and yaw control, rudder and aileron sizing.

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Week 15	Turning Flight, Pitch maneuverability.

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):
Team working, written communication

Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content outline	Teaching and Learning Activities						TOTAL SLT
	Guided Learning (Face to Face)				Guided Learning Non-Face to Face	Independent Learning Non-Face to face	
CLO	**L**	**T**	**P**	**O**			
CLO 1	2h					3h	**5h**
CLO 2	4h					6h	**10h**
CLO 3	10h					13h	**23h**
CLO 4	10h					13h	**23h**
CLO 5	2h					4h	**6h**
Total SLT	**28h**				**4h**	**39h**	**67h**

	Continuous Assessment	PLO	Percentage	Total SLT
1	Quiz 1	PLO1 (KW)	2.5	15m
2	Quiz 2	PLO1 (KW)	2.5	15m
3	Test 1	PLO1 (KW)	20	1h15m
4	Test 2	PLO1 (KW)	20	1h15m
5	Project 1	PLO10 (TW), PLO11 (SC)	15	10h
	Final Assessment		Percentage	Total SLT
6	Final Examination	PLO1 (KW), PLO2 (THPA)	40	2h
Grand Total			**100**	**80h**

L: Lecture, T: Tutorial, P: Practical, O: Others

Special requirement to deliver the course (e.g: software, nursery, computer lab, simulation room):

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Modern tool

Learning resources:

REFERENCES

Book

1. Anderson J D, Jr; Aircraft Performance & Design, McGraw-Hill Book Company, 1998.
2. Shevell R S, Fundamentals of Flight, Prentice Hall, 2nd Edition, 1989.
3. Eshelby M, Aircraft Performance – Theory and Practice, Arnold 2000.
4. J. B. Russell, Performance & Stability of Aircraft, Arnold 1996.
5. McCormick,B.W., "Aerodynamics, Aeronautics and Flight Mechanics", Wiley, 1995.
6. L. Houghton L, Carpenter PW; “Aerodynamics for Engineering Students”, Wiley, 1993.
7. Nelson R C, “Flight Stability and Automatic Control”, McGRaw-Hill, , 1998.

Online

https://people.utm.my/mnazri/flight_mechanic/

Academic honesty and plagiarism:

Assignments are individual tasks and NOT group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES) Copying of work (texts, simulation results etc.) from other students/groups or from other sources is not allowed. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of **zero** for the assignment and disciplinary steps may be taken by the Faculty. It is also unacceptable to do somebody else’s work, to lend your work to them or to make your work available to them to copy.

Other additional information (Course policy, any specific instruction etc.):

Prepared by:	Certified by:
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ATTENDANCE The student should adhere to the rules of attendance as stated in the University Academic Regulation :-

- Student must attend not less than 80% of lecture hours as required for the subject.
- The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

Disclaimer:

Prepared by:	Certified by:
Name: Ir. Dr.-Ing. Mohd Nazri bin Mohd Nasir Signature:  Date: 25/10/2021	Name: Prof. Ir. Dr. Pakharuddin Md Samin Signature: Date: