

COURSE INFORMATION

School/ Faculty:	School of Mechanical Engineering / Faculty of Engineering	Page:	1 of 7
Course code:	SEMT 4523	Academic Session/Semester:	20182019/1
Course name:	Aircraft Design II	Pre/co requisite (course name and code, if applicable):	Aircraft Design I, (SEMT 4512), Aircraft Structure II (SEMT 4143)
Credit hours:	3		

Course synopsis	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.			
Course coordinator (if applicable)	Ir. Dr.-Ing. Mohd. Nazri bin Mohd. Nasir			
Course lecturer(s)	Name	Office	Contact no.	E-mail
	Ir. Dr. Shabudin Bin Mat	Aerolab, P20	Ext. 35848	shabudin@utm.my
	Ir. Dr.-Ing. Mohd. Nazri bin Mohd. Nasir	UTM Hangar	011-10845041	mnazrimnasir@utm.my
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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	Analyse the loads acting on the main structural components of the aircraft.	PLO1 (KW), PLO2 (THPA)	C4	Lecture, active learning	PR & Pr
CLO2	Generate the sustainable and detailed structural design of the main components of the aircraft.	PLO2 (THPA), PLO3 (THDS), PLO7 (GCS)	C5 , GC5	Lecture, active learning	PR & Pr

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CLO3	Design one selected aircraft system component such as the hydraulic system, the control system, avionics, auxiliary power, landing gear etc.	PLO3 (THDS), PLO4 (THI), PLO7 (GCS)	C6, P7, GC5	Lecture, active learning	PR & Pr
CLO4	Prepare assembly drawings of the aircraft airframe integrating all structural components and design of the joints and attachments by following local and international authorities' guidelines.	PLO1 (KW), PLO5 (SCMT) PLO6	C3	Lecture, active learning	PR & Pr
CLO5	Demonstrate the ability to think critically and solve problems with regards to aircraft design.	PLO2 (THPA)	P4	Lecture, active learning	PR & Pr
CLO6	Adapt the ability to work in a team independently and prepare project management plans to produce an aircraft design.	PLO10 (TW) PLO12 (TW)	A4 (TH1, TH3)	Lecture, active learning	PR & Pr

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Signature:		Signature:	
Date:	4/8/2021	Date:	

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CLO7	Demonstrate the ability to present Ideas & solutions orally and written.	PLO9 (CS)	A3 (CS1, CS2)	Lecture, active learning	PR & 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
1.	Active learning	Conducted group Discussion & E-Learning

Weekly Schedule:

Week 1	General Introduction Aircraft Preliminary Design Review. Overview of Aircraft Detail Design.
Week 2	Loadings on an Aircraft Airworthiness regulations and requirements. Manoeuvre and gust n-V diagrams. Loads on an aircraft under various flight conditions.
Week 3	Loadings on an Aircraft (continued) Overall wing load distribution. Spanwise load distribution. Chordwise load distribution. Loads on the tailplane. Loads on the fuselage. Hinge loads. Shear force diagrams. Bending moment diagrams. Torsion diagrams.
Week 4	Detailed Structural Design Introduction to airframe structures. Types of structures. Aircraft structural materials. Aluminium sheet and stiffener structure. Design layout. Wing components design: wing section, spar and ribs sizing, web and skin thickness.
Week 5	Detailed Structural Design (continued) Continuation of wing design. Review of thin sheet instability analysis. Ailerons and flaps design. Tailplane design: stabiliser, elevator, fin, rudder.

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Week 6	Detailed Structural Design (continued) Fuselage structural design. Skin thickness. Frames and bulkhead design.
Week 7	Detailed Structural Design (continued) Continuation of fuselage design. Components attachment and fitting. Riveting. Detailed drawing.
Week 8	Semester Break
Week 9	System Design: Wing detail Design Introduction to wing design. Literature review on wing design. Types of attachment between the main wing and the fuselage
Week 10	Wing Design (continued) Main wing design, materials. Materials selection
Week 11	Wing Design (continued) Detail design of the main wing / Detail attachment between the wing and the fuselage
Week 12	Wing detail Analysis Detailed analysis of load acting on the wing/spar
Week 13	Wing detail Analysis (continued) Detailed analysis of the spar
Week 14	Wing detail Analysis (continued) Detailed analysis of the Rib
Week 14	Wing detail Analysis (continued) Detailed analysis (Continue)

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	

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						Non-Face to face	
CLO	L	T	P	O			
CLO 1	4h			4h		2h	10h
CLO 2	3h			4h		2h	9h
CLO 3	3h			4h		2h	9h
CLO 4	3h			4h		2h	9h
CLO 5	3h			5h		2h	10h
CLO 6	3h			5h		2h	10h
CLO 7	3h			5h		2h	10h
CLO 9	3h			5h		2h	10h
CLO 10	3h			5h		3h	11h
CLO 12	3h			6h		3h	12h
Total SLT	28 h			42h		20h	90h

Continuous Assessment		PLO	Percentage	Total SLT
1	Design Project 1	PLO1 (KW), PLO2 (THPA), PLO3 (THDS), PLO5, PLO6, PLO10	20	6h45m
2	Design Project 2	PLO2 (THPA), PLO3 (THDS) , PLO5, PLO6, PLO7 (GCS) , PLO10	20	6h45m
3	Design Project 3	PLO2 (THPA), PLO3 (THDS) , PLO5, PLO6, PLO7 (GCS) , PLO10	20	6h45m
4	Design Project 4	PLO2 (THPA), PLO3 (THDS) , PLO5, PLO6 , PLO10, PLO12	20	6h45m
5	Test 1	PLO4 (THI)	5	1h
6	Test 2	PLO3 (THDS), PLO4 (THI)	5	1h45m

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7	Presentation	PLO3 (THDS), PLO5, PLO10	10	15m
	Final Assessment		Percentage	Total SLT 30h
1	Final Examination		0	0
Grand Total			100	120h

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

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

Computer lab with Modern Tools Implementation of 3 hours of studio equivalent to 1 credit hour of lecture
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Learning resources:

REFERENCES 1. Bruhn, E.F., Analysis and Design of Flight Vehicle Structures, S. R Jacobs and Associates, Inc., Indianapolis, 1958. 2. Megson, T.H.G., Aircraft Structures for Engineering Students, Edward Arnold, London, 1972. 3. Nelson, R.C., Flight Stability and Automatic Control, WCB McGraw-Hill, Boston, 1998. 4. Peery, D.J., and Azar, J.J., Aircraft Structures, Second Edition, McGraw Hill Co., New York, 1982. 5. Raymer, D.P., Aircraft Design: A Conceptual Approach, AIAA, Washington D.C., 1992. 6. Rivello, Robert M., Theory and Analysis of Flight Structures, McGraw Hill Co., New York 1969. 7. Roskam, J., Airplane Design, DAR Corporation, Lawrence, 2008. 8. Torenbeek, E., Synthesis of Subsonic Airplane Design, Kluwer Academic Publishers, Dordrecht, 1982.
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Other additional information (Course policy, any specific instruction etc.):

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