

Subject Description Form

Subject Code	AAE3002
Subject Title	Aircraft Structures and Materials
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AAE2006 Statics & Mechanics of Materials
Objectives	<ol style="list-style-type: none"> 1. To provide students key knowledge relevant to aircraft structures and materials; and 2. To provide students an overview of the composites used in modern aircraft; and 3. To provide students with stress analysis tools to formulate and solve engineering problems related to aircraft structures and materials.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Demonstrate a good understanding of key aspects of aircraft structures; and b. Analyze and assess aircraft structures subject to various types of loading using stress analysis tools and failure criteria; and c. Comprehend characteristics of various materials used in aircraft; and d. Understand mechanical behaviors of composite materials used in aircraft.
Subject Synopsis/ Indicative Syllabus	<p>Characteristics of Aircraft Structures - Aircraft structural elements. Wing, fuselage, tail and landing gear. Riveting. Aircraft fasteners. Adhesive joint.</p> <p>Fundamentals of Aircraft Materials - Material fundamentals. Metallic alloys and their heat treatment. Composites.</p> <p>Aircraft Structural Analysis – Loads Applied on Aircraft. Bending, shear, torsion of thin-walled beam. Structural idealization. Practical stress analysis of wings and fuselages under combined loading.</p> <p>Failure Criteria for Isotropic Materials - Strength criteria for brittle materials. Yield criteria for ductile materials. Stress concentration. Fatigue. Fracture. Stability of beams under transverse and axial loads</p> <p>Fundamentals of Aircraft Composites - Mechanical behavior of composite materials. Processing and Fabrication techniques for aircraft composites.</p>

Teaching/Learning Methodology	Lectures and tutorials are used to deliver the fundamental knowledge in relation to aircraft structures and materials (outcomes a to d).					
Assessment Methods in Alignment with Intended Learning Outcomes	Teaching / Learning Methodology		Intended subject learning outcomes to be covered			
	1. Lectures	✓	✓	✓	✓	
	2. Tutorials	✓	✓	✓	✓	
	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be covered			
	1. Examination	60%	✓	✓	✓	✓
2. Assignments and quiz	30%	✓	✓	✓	✓	
3. Midterm exam	10%	✓	✓			
Total	100%					
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.	

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

Overall Assessment:

$$0.6 \times \text{End of Subject Examination} + 0.4 \times \text{Continuous Assessment}$$

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.

Reading List and References	<ol style="list-style-type: none">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.
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Revised in January 2022