

## Subject Description Form

<b>Subject Code</b>	AAE3002
<b>Subject Title</b>	Aircraft Structures and Materials
<b>Credit Value</b>	3
<b>Level</b>	3
<b>Pre-requisite / Co-requisite/ Exclusion</b>	<b>Pre-requisite:</b> ENG2001 Fundamentals of Materials Science and Engineering <b>AND</b> ME23001 Engineering Mechanics
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To provide students with the key knowledge relevant to aircraft structures and materials; and</li> <li>2. To provide students with an overview of the composite materials used in modern aircraft; and</li> <li>3. To provide students with the numerical methods for formulating and solving engineering problems related to aircraft structures and materials.</li> </ol>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. Demonstrate a good understanding of the key aspects of aircraft structures; and</li> <li>b. Comprehend the characteristics of the various materials used in aircrafts; and</li> <li>c. Analyze and assess aircraft structures subject to various types of loading using stress analysis methods and failure criteria; and</li> <li>d. Understand the mechanical behaviors of the composite materials used in aircrafts.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Characteristics of Aircraft Structures</b> – Aircraft structural elements. Wing, fuselage, tail and landing gear. Riveting, fastener and adhesive joint.</p> <p><b>Aircraft Structural Analysis</b> – Typical loadings applied on aircrafts. Bending, shear, torsion of thin-wall structures. Structural idealization. Practical stress analysis of wings and fuselages under combined loading.</p> <p><b>Fundamentals of Aircraft Materials</b> – Material fundamentals. Metallic alloys and their heat treatment. Composites.</p> <p><b>Failure Criteria for Isotropic Materials</b> – Strength criteria for brittle materials. Yield criteria for ductile materials. Stress concentration. Fatigue. Fracture. Stability of beams under transverse and axial loads.</p> <p><b>Fundamentals of Aircraft Composites</b> – Mechanical behaviors of composite materials. Processing and fabrication techniques for aircraft composites.</p>

Teaching/Learning Methodology	Lectures are used to deliver the fundamental knowledge in relation to aircraft structures and materials (outcomes a to d).					
	Teaching / Learning Methodology	Intended subject learning outcomes to be covered				
		a	b	c	d	
	1. Lectures	✓	✓	✓	✓	
	2. Tutorials	✓	✓	✓	✓	
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be covered			
			a	b	c	d
	1. Final examination	60%	✓	✓	✓	✓
	2. Take-home assignments and in-class quizzes	40%	✓	✓	✓	✓
	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		26 Hrs.				
▪ Tutorials		13 Hrs.				
Other student study effort:						
▪ Self-study		39 Hrs.				
▪ Assessment preparation		39 Hrs.				
Total student study effort		117 Hrs.				

<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. C.T. Sun, Mechanics of Aircraft Structures, John Wiley &amp; Sons, latest edition.</li> <li>2. T.H.G. Megson, Aircraft Structures for Engineering Students, Elsevier, latest edition.</li> <li>3. R.F. Gibson, Principles of Composite Material Mechanics, McGraw-Hill International Editions, latest edition.</li> </ol>
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Revised in Aug 2023