

### Subject Description Form

<b>Subject Code</b>	AAE5202
<b>Subject Title</b>	Advanced Aircraft Structures and Materials
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Exclusion: ME577 Advanced Aircraft Structures
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To provide students an overview of the structures in modern aircraft.</li> <li>2. To provide students with tools that are needed to formulate and solve problems concerning compression/tension, bending, torsion and buckling in aircraft structures.</li> <li>3. To provide students with an overview of the advanced materials that are used for aircraft vehicles.</li> <li>4. To provide students with an overview of the non-destructive testing techniques that are used to ensure the safe operation of aircraft vehicles.</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. perform stress analysis for typical aircraft structural components using both analytical methods and computational tools;</li> <li>b. obtain in-depth understanding of the mechanical behavior of the materials that are used for aircraft vehicles;</li> <li>c. choose the non-destructive testing methods that best suit certain aerospace structural components; and</li> <li>d. recognize the frontier of research in aircraft structures and materials.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Structures:</b> Fuselage; Wing; Tail; Landing gear; Thin-wall beams; Tapered beams; Ribs; Cut-outs; Loads applied on airframes; Stress analysis of aircraft structural components</p> <p><b>Materials:</b> Typical aircraft materials and material characteristics; Characteristics of composite materials</p> <p><b>Non-destructive testing and evaluation of aircraft structures (NDT&amp;E):</b> Finite element method (FEM) for the analysis of aircraft structures</p>

Teaching/Learning Methodology	Lectures, tutorials and guided study by project/case study/literature survey are used to deliver the fundamental knowledge and research elements in relation to aircraft structures and materials.					
	Teaching/Learning Methodology		Outcomes			
			a	b	c	d
	Lecture	√	√	√	√	
	Tutorial/Guided Study	√	√	√	√	
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			a	b	c	d
	1. Project report	20%	√	√		
	2. Assignment	40%		√	√	√
	3. Final examination	40%	√	√	√	√
	Total	100%				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:					
	Overall Assessment:					
	$0.6 \times \text{Continuous Assessment} + 0.4 \times \text{Final Examination}$					
	The project report is aimed at enhancing the students’ comprehension and understanding of aircraft structures and the state-of-the-art technologies in relevant area. The assignment is used to assess the students’ understanding of the stress analysis methods and their capabilities of mathematical problem formulation and programme application for typical aircraft structures. The final examination will be conducted to evaluate the students’ performance in all the topics of the syllabus with a limited examination time.					
Student Study Effort Expected	Class contact:					
	▪ Lecture				39 Hrs.	
	Other student study effort:					
	▪ Self-learning				45 Hrs.	
	▪ Project report preparation				22 Hrs.	
	Total student study effort				106 Hrs.	

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

July 2023