

## MECH3650 Aircraft Structures

<b>Course Code:</b> MECH3650	<b>Course Title:</b> Aircraft Structures
<b>Required Course Or Elective Course:</b> Elective for BEng(MECH)/Required for Aero Major	<b>Terms Offered (Credits):</b> Fall (3 credits)
<b>Faculty In Charge:</b> Jinglei YANG	<b>Pre/Co-Requisites:</b> MECH 1907 OR MECH 2040 OR CIVL 2120
<b>Course Structure:</b> 2 lectures/week, 80 minutes each; 1 tutorial/week, 50 minutes	
<b>Textbook/Required Material:</b>	
<ul style="list-style-type: none"> <li>➤ <i>An Introduction to Aircraft Structural Analysis</i>, 2<sup>nd</sup> Ed. by THG Megson</li> <li>➤ Lecture notes</li> </ul>	
<b>Course Description:</b>	
<p>The components of aircraft structures are subjected to forces and deformed elastically during the life of service.</p> <ol style="list-style-type: none"> <li>1. This course covers the general information of aircraft structures and materials, and transfer of external aerodynamic loads into structural internal forces. The focus is to deliver the fundamental knowledge for stresses, deflection, and buckling analysis of these structural components under various static loading conditions including torsion, bending and shear.</li> <li>2. There are two main activities in this course. The first is lectures which emphasize the fundamentals of structural mechanics and analytical approaches for analysis of aircraft structures. The students will learn to derive the theory of linear elasticity and apply it to analyze the components subjected to typical aircraft loading conditions and design requirements.</li> <li>3. The second is tutorials which provide a set of lessons and exercises teaching the concepts and methodology in analysis of aircraft structures. The students will be able to learn and understand the procedure of aircraft structural analysis from following tutorial problem solving exercises with group discussions.</li> </ol>	
<b>Course Topics:</b>	
<ol style="list-style-type: none"> <li>1. Historical development of aircraft structures and materials</li> <li>2. Loads and forces in aircraft structures</li> <li>3. Stress, Strain, and the Theory of Elasticity</li> <li>4. Stress analysis of structural components under torsion, bending, and shear</li> <li>5. Practical stress analysis of fuselages and wings</li> <li>6. Deflection and buckling with energy methods</li> </ol>	
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To know the basic structures and materials used in aircraft and aerospace.</li> <li>2. To understand the loads and forces in aircraft structures.</li> <li>3. To be familiar with stress analysis of various aircraft structures using elasticity theory under different static loading conditions.</li> <li>4. To understand stability of thin-walled structures.</li> <li>5. To understand the basic principles of energy method.</li> </ol>
<b>Course Outcomes:</b>	<ol style="list-style-type: none"> <li>A. Able to visualize the complexity of structural components and materials of the aircraft and understand their functions.</li> <li>B. Able to visualize how external aerodynamic loads give rise to internal stresses and deformations.</li> </ol>

	<ul style="list-style-type: none"><li>C. Able to apply the theories to analyze various aircraft structural components subject to different loading conditions.</li><li>D. Able to apply energy methods for deformation analysis.</li><li>E. Have the capability to assess whether aircraft structural components are able to withstand the applied loads and meet specified performance.</li></ul>
<b>Assessment Tools:</b>	Homework : 10% Midterm exam: 20% Final exam: 70%