

**MECH4820 –Flight Mechanics**

<b>Course Code:</b> MECH 4820	<b>Course Title:</b> Flight Mechanics
<b>Required Course Or Elective Course:</b> Elective Course	<b>Terms Offered (Credits):</b> Fall or Spring (3 credits)
<b>Faculty In Charge:</b> Xun Huang	<b>Pre-Requisites:</b> MECH 2210
<b>Course Structure:</b> Lecture – 3 hours per week; Tutorial – 1 hour per week	
<b>Textbook/Required Material:</b> Yechout, T. R. et al., Introduction to aircraft flight mechanics, AIAA Education Series, 2003. OTHER REFERENCES: (1) Etkin, B., and Reid, L. D., Dynamics of Flight: Stability and Control, 3rd Ed., John Wiley & Sons, 1996. (2) Pamadi, B. N., Performance, Stability, Dynamics, and Control of Airplanes, AIAA Education Series, 1998. (3) Supplementary materials will be delivered during the lectures.	
<b>Course Description:</b> An introduction to atmospheric flight vehicle dynamics, static stability, and performance and the related aerodynamics, propulsion, and Equations of motion. The two lectures each week will try to link aerodynamics and mechanics together to explain flight mechanics in particular. In addition, classical design and analysis tools will be introduced during the lectures and/or tutorials. Students are expected to spend no less than an additional four hours per week to go through lecture materials and prepare homework.	
<b>Course Topics:</b> <ol style="list-style-type: none"><li>1. Review of basic aerodynamics</li><li>2. Aerodynamic analysis method and tools (lifting line theory, panel method and xfoil etc.)</li><li>3. Review of basic propulsion</li><li>4. Modeling of aircraft turbofan engine</li><li>5. Aircraft performance</li><li>6. Aircraft equations of motion (EoM)</li><li>7. Matlab modeling of aircraft EoM</li><li>8. Aircraft static stability</li><li>9. Analysis tool of stability</li></ol>	
<b>Course Objectives:</b>	1. To introduce basic concepts of aerodynamics and propulsions directly related to flight mechanics.

	<ol style="list-style-type: none"> <li>2. To provide students with fundamental understanding of aerodynamics and propulsions for aircraft performance in classical flying stages.</li> <li>3. To equip student to grasp classical analysis and design methods and computer tools pertaining to aircraft aerodynamics, performance and static stability.</li> </ol>
<b>Course Outcomes:</b>	<ol style="list-style-type: none"> <li>A. Become proficient in evaluating basic aerodynamic and flight performance characteristics of aircraft.</li> <li>B. The student will have a clear understanding of the fundamental concepts leading to aircraft flight mechanics and performance.</li> </ol>
<b>Assessment Tools:</b>	<ul style="list-style-type: none"> <li>• Homework            30%</li> <li>• Mid-term            30%</li> <li>• Final                 40%</li> </ul>