

MECH3670 Aircraft Performance and Stability

Course Code: MECH3670	Course Title: Aircraft Performance and Stability	
Required Course Or Elective Course: Required	Terms Offered (Credits): Spring (3 credits)	
Faculty In Charge: Xun Huang	Pre/Co-Requisites: CENG2220 OR CIVL2510 OR MECH1907 OR MECH2020 OR MECH2210	
Course Structure: 2 classes (1.5 hours each session) per week; Tutorial: 1 hour per week		
Textbook/Required Material: <ol style="list-style-type: none"> 1. Yechout, T. R. et al., Introduction to aircraft flight mechanics, AIAA Education Series, 2003. 2. Cook, M. V. Flight Dynamics Principles. 2nd ed. Elsevier, 2007. 3. Bernard E. and Reid L. D. Dynamics of Flight: Stability and Control. 3rd ed. 1995. 4. Lecture notes. 		
Course Description: This course is part of the Aerospace Engineering major. It covers topics such as aircraft dynamics and the related aerodynamics, static stability, lateral and longitudinal dynamics, and basic flight performance and control.		
Course Topics: <ol style="list-style-type: none"> 1. Introduction 2. Low-speed aerodynamics 3. Flight performance (basic terms) 4. Static stability (coordinates; basic terms) 5. Aircraft equation of motion (State-space model; Euler angles and transformation) 6. Linearized equations of motion 7. Longitudinal dynamics 8. Lateral and directional dynamics 9. Revisiting control principles (state space and transfer function) 10. Autopilot design 		
Course Objectives:	<ol style="list-style-type: none"> 1. To equip the students with fundamental concepts of aircraft performance and stability. 2. To introduce basic concepts of static and dynamic stability. 3. To provide students an extensive overview of analysis and control issues pertaining to aircraft performance and stability. 	
Course Outcomes:	<ol style="list-style-type: none"> A. Become proficient in evaluating basic performance characteristics of aircraft. B. The student will have a clear understanding of the fundamental concepts leading to aircraft performance and stability. C. Ability to comprehend fundamentals of flight control system and autopilots design. 	
Assessment Tools:	Weekly homework problems	20%
	Mid-term test	30%
	Final exam	50%